Corporate innovation management geared to long-term success calls for a strategy to grow innovations into a substantial competitive advantage. This, however, coincides with an enormous failure-rate at the market, especially in the field of breakthrough innovations. Hence, in recent times, companies are trying to alleviate the risk of lacking user-acceptance through opening their innovation processes to external actors, particularly customers. The method of integrating lead users is determined by the effective and systematic identification of leading-edge customers, which is considered to be a critical phase within this approach. With the arrival of Web 2.0 applications, there is a huge potential to improve these selection processes. Our research into online communities and weblogs scrutinised the search criteria in an online environment and revealed the following characteristics as crucial factors for the online identification of lead users: being ahead of a market trend, high expected benefits, user expertise and motivation, extreme user needs as well as opinion leadership and an online commitment.

Keywords: New product development; lead user; web 2.0; online communities; user-centric innovation.

Introduction

Innovations have long been considered to have a profound effect on the prosperity of businesses (Albach, 1989; Wheelwright and Clark, 1992; Cooper, 2002). However, their potential of growing into a competitive advantage coincides with an enormous failure-rate at the market especially in the field of breakthrough innovations.
Therefore, companies are trying to alleviate the lack of user-acceptance through opening their innovation processes to external actors, particularly customers (Brem, 2008). Such customer-centric innovations not only harness the voice-of-the-customer but also take a further step beyond the traditional market research by integrating users as problem solvers in various phases of the individual innovation process. In this context, the lead-user method is applied to capitalise on users with certain attributes, i.e., leading-edge customers, who are to benefit tremendously from innovative solutions. Hence, efficient processes and methods for a sustainable identification and integration of customers into the corporate innovation process are crucial to the success of new product development (NPD) (Herstatt, 1991; Olson and Bakke, 2001; Prügl, 2006; Brem and Voigt, 2007).

Another mega-trend of our time, trying to make use of the democratic powers of the Internet users, is epitomised by the buzzword web 2.0. After the “new economy” crash, the prevalent static Internet appearances of many dotcom businesses were gradually re-vitalised incorporating mechanisms that make use of the wisdom of crowds (O’Reilly, 2005). These web 2.0 applications such as online communities and weblogs are constantly getting more and more integrated in people’s everyday lives — and meanwhile in companies’ daily business as well.

The Internet and search engines in particular serve as a panacea for all kinds of search requests today. Yet, there is only a very limited body of research addressing the opportunities these new and highly personalised tools like communities and weblogs bear with respect to the efficient identification of lead users.

The primary aim of this paper is hence to elaborate the potential web 2.0 applications hold to support the systematic identification of lead users. This appears to be necessary in the light of the huge deficiencies the lead-user method that shows in the pivotal phase of the lead-user identification. Our approach was stimulated by a striking extensive networking of users and their willingness to reveal the personal as well as innovation-related information in online applications.

**Literature Review**

The way towards user-centric innovation was paved by the shift from the manufacturer-active to customer-active paradigm in the late 1970s (von Hippel, 1978a,b; Foxall and Tierney 1984). Since then, the development of user-centric innovation has constantly gained momentum and experienced a tremendous boost, in interest, in the wake of the widespread use of the Internet. The term, “lead user”, was coined and conceptionally developed by von Hippel (1986, 1988) more than 20 years ago. According to this concept, lead users are originally characterised by two fundamental criteria: first, they experience certain needs significantly earlier than the bulk of the market and thus serve as a “need-forecasting laboratory”. Second,
they are positioned to benefit notably from innovative solutions. For the purpose of practical applications of the method, a process consisting of four phases was devised (von Hippel, 1986; Lüthje and Herstatt, 2004): an initial preparatory phase and a phase of trend identification, i.e., trends the lead users are to be ahead of, are followed by the lead-user identification per se. In the frame of a workshop (phase 4), the identified lead users participate in the generation of new ideas and product concepts.

Since then, projects implementing the lead-user method were carried out in a variety of industries. This method proved to be a systematic approach for generating breakthrough innovations and was able to outperform comparable innovative approaches (Urban and von Hippel, 1988; Herstatt, 1991; von Hippel et al., 1999; Lilien et al., 2002; Morrison et al., 2004). Based on the original lead-user concept, additional criteria and antecedents depicting lead users were explored, particularly facilitating the search for lead users in consumer goods markets with a substantially greater number of anonymous users as opposed to industrial markets (Lüthje, 2000; Lettl, 2004; Franke et al., 2006).

Research also centred around search methods that are best suited to ensure an efficient identification of users characterised by the relevant search criteria (Urban and von Hippel, 1988; Prügl, 2006). Three distinct search methods have been conceived and applied: the screening method tests any person within a sample of all users for the presence of the criteria found relevant for the specific search purpose. The pyramiding or networking procedure takes a different approach starting out from a small number of persons and iteratively working its way up in the pyramid of expertise via recommendations. The pyramiding search distinguishes itself by increasing the chances of identifying leading-edge users in analogous markets following references of users in the target market. The broadcasting method has recently been applied in lead-user projects. Therein, the formulation of a problem is broadcasted to a group of potential problem solvers outside the company (Lakhani, 2006; Hienerth et al., 2007). However, research in this area indicates that companies are still facing considerable problems in efficiently identifying suitable users (Olson and Bakke, 2001; Lilien et al., 2002; Prügl, 2006; Brem and Voigt, 2007).

Surprisingly, the role of the Internet for the identification of lead users has scarcely been examined yet (Herstatt, 2003; Henkel and Sander, 2007). Different approaches were taken to integrate users in the various stages of the value chain, for instance, mass customisation or toolkits for user innovation (von Hippel, 2001; von Hippel and Katz, 2002; Thomke and von Hippel, 2002; Franke and von Hippel, 2003; Jeppesen, 2002; Prügl and Schreier, 2006), community-based innovation (Füller et al., 2006) or netnography (Kozinets, 1998, 2002; Füller et al., 2007). Whereas the core of netnography is to observe users’ computer-mediated interaction, for instance, in communities, most other user-oriented innovation approaches aim at
directly integrating users in the stage of idea generation and conceptualisation by shifting the individual trial-and-error process into an online realm by means of a user interface.

The principles of an open innovation (Chesbrough, 2003) and the co-operative innovative activities of users in communities have gained widespread notice alongside the evolvement of the Internet towards a platform connecting people and allowing for participation known under the notion Web 2.0 (O’Reilly, 2005). An extensive research on open source software (Raymond, 2001; von Hippel, 2001; Lerner and Tirole, 2002; Lakhani and von Hippel, 2003; von Hippel and von Krogh, 2003) and on innovative communities predominantly in the domain of extreme sports has been carried out. The probability of innovations to be generated, users’ motives and willingness to share information are the aspects that have been examined as well as the characteristics of innovating users, their collaborative behaviour and the transformation of the character of the community (Shah, 2000; Franko and Shah, 2003; Lüthje, 2004; Hemetsberger and Reinhardt, 2004; Lüthje et al., 2005; Hienerth, 2006; Jeppesen and Frederiksen, 2006; Füller et al., 2006; Prügl and Schreier, 2006; Füller et al., 2007).

The following considerations will shed light on the lead-user method trying to conceptually link the recruitment of lead users to the online environment.

**Conceptual Framework**

The focus of this paper is the lead-user method, which can be delineated in the field of user-centred innovation concepts along multiple dimensions. In terms of a processual classification, the lead-user method is situated in the *fuzzy front end* (Khurana and Rosenthal, 1997; Kim and Wilemon, 2002) as a tool for systematic idea-generation and conceptualisation in the early phases of an innovation project. In contrast to the customer-specific configuration in later phases of the NPD, i.e., *mass customisation* using toolkits, the lead-user method does not limit the solution space within which users can generate ideas and is designed to integrate users in a face-to-face workshop rather than in an online setting. The non-representative nature is characteristic of the lead-user method that explicitly tries to explore the leading-edge customers’ solutions to problems. Whereas traditional customer-oriented approaches concentrate on eliciting customers’ representative needs in order to tailor their products to them, the lead-user method aims at users with exceptional qualities (Fig. 1).

In order to identify innovative user ideas with an outstanding commercial potential, the first criterion of a lead-user is that at the leading edge of significant trends in the market. Perceiving certain demands earlier than the bulk of the market — virtually living in the future as to a certain trend — enables lead users to gain “real-world
experience” that is still further forward in time for the average consumer. Consequently, lead users are capable of overcoming an effect called functional fixedness, which explains the phenomenon that users’ innovative potential is bound to the previous related experiences (Duncker, 1945; Birch and Rabinowitz, 1951; Adamson and Taylor, 1954; von Hippel, 1986). Although lead users are subject to the same cognitive restrictions, they are well set-up to create breakthrough innovations by virtue of their “living in the future”. However, leading-edge needs do not necessarily entail the customer’s motivation to innovate thus requiring a second component: users were found to be more inclined to innovate when they expect a high benefit from a solution to their needs (Mansfield, 1968; Urban and von Hippel, 1988; Franke et al., 2006).

Within the lead-user method, the identification of lead users according to the aforementioned criteria is of supreme importance, however, still showing room for improvements (Olson and Bakke, 2001; Lilien et al., 2002; Prügl, 2006). The process of identification can be divided into two main parts: 1. gathering appropriate criteria for the purpose of the innovation project and 2. screening users and identifying lead users who meet the set of criteria. The emphasis of this paper is laid on the compilation of the criteria used in the “offline world”, which are to be accommodated to the online environment. Nevertheless, the following approach does not intend to
draw a clear dividing line between the two parts of the identification process, but to integrate the pertinent aspects of the subsequent screening process in an effort to extend the application of criteria to the "online world".

Before we will commence the extension of the criteria, recent developments of the Internet are to be briefly outlined. The buzzword web 2.0 has been the subject of a plethora of discussions on the Internet that predominantly revolve around O’Reilly’s deliberations (O’Reilly, 2005). Many attempts of making the notion web 2.0 understandable have certain fundamental principles and axioms in common among which is the participation of users in networked structures (O’Reilly, 2005; Kolbitsch and Maurer, 2006; Bienert, 2007; Maaß and Pietsch, 2007). This high degree of user interaction can be observed in an abundance of popular web 2.0 applications, e.g., MySpace, Facebook, Twitter, Wikipedia, Last.fm, YouTube, Flickr, Del.icio.us, Digg, Ning etc. Due to the collaborative and interactive essence of the Web 2.0 applications, the demarcation line between the producer and consumer has been notably blurred (Prahalad and Ramaswamy, 2000; Krempl, 2006; Bunz, 2006). Most prominent among the web 2.0 applications are the online communities, also known as social networking sites (Rheingold, 1993; Hagel and Armstrong, 1997; Whittaker et al., 1997; Preece, 2000; Prügl and Schreier, 2006; Füller et al., 2007; Henkel and Sander, 2007) and weblogs (Blood, 2000, 2004; Schmidt, 2006; Wright, 2006).

For the purpose of this paper, communities are defined as “social aggregations that emerge from the Net when enough people carry on public discussions long enough, with sufficient human feelings, to form webs of personal relationships in cyberspace” (Rheingold, 1993, S.5). Weblogs have generally been accepted to be frequently updated websites consisting of dated entries arranged in reverse chronological order (Blood, 2004; Efimova et al., 2005; Schmidt et al., 2005; Wright, 2006). The total number of weblogs called blogosphere is, sometimes, also considered a community (Efimova and de Moor, 2005; Efimova et al., 2005). Likewise, the majority of the social networking sites (e.g., MySpace, Facebook, etc.) offer integrated weblogs as a core communication feature. Consequently, strict differentiation between the two applications is not practical.

As prior research made evident, users prefer innovating in groups rather than as isolated individuals (Franke and Shah, 2003; Lettl, 2004; Lüthje et al., 2005; Füller et al., 2007). Both online communities and weblogs enjoy increasing popularity and amount to a significant share of total media consumption (van Eimeren and Frees, 2006; Madden and Fox, 2006; Madden, 2006). Hence, Web 2.0 applications appear to be a key supplement to social “offline life” and consumption behaviour covering a huge variety of fields in terms of the content such as interests, hobbies or brands (Hagel and Armstrong, 1997; Kozinets, 1999; McWilliam, 2000; McAlexander
et al., 2002; Kozinets, 2002). The recent development of the online communities into platforms conducive to co-operative innovation activities asks for a re-consideration of the lead-user identification process.

Choosing the identification criteria as a starting point seems to be sound for two reasons. First, the criteria developed to identify lead users or innovative users have been devised in front of an offline background, thus lacking a conceptualisation tailored to the online environment. Second, the democratic nature of the web 2.0 may have the potential to overcome the anonymity prevalent in consumer markets that impedes a thorough identification of qualified users (Meffert, 1993; Wikström, 1996).

In an attempt to harness the innovative potential of users in communities and weblogs, two radically different methods can be adopted. Creating and establishing an individual online application solely designed to identify lead users (Spann and Skiera, 2003; Ernst et al., 2004) can be juxtaposed with the usage of applications that already exist (Kozinets, 2002; Füller et al., 2006). Within the framework of this paper, existing outside applications are to be concentrated on by virtue of the dominance and the enormous popularity they have already gained in the market. Leading-edge users are likely to be already committed to communities as active members. Thus, it appears to be difficult to induce them to join another network due to lock-in effects that communities have, once they have reached the critical mass of members.

A comprehensive analysis of the literature on user-centric innovation was accomplished for this paper and numerous search criteria from offline settings were compiled (Table 1). In addition to the original lead-user characteristics (von Hippel, 1988), criteria positively correlated to the lead-user construct and those describing innovative users have been taken into consideration as well. The collection of search criteria is meant to furnish a pool of criteria from which search criteria can be selected for one specific innovation project in order to correspond to a certain innovation purpose in the best possible way (Lüthje and Herstatt, 2004; Füller et al., 2006; Hienerth et al., 2007; Lüthje, 2007). In an effort to reveal the full potential of the web 2.0 applications for lead-user search, the set of offline criteria is “extrapolated” to the online environment of communities and weblogs. To accomplish this, the paper refers to the concepts in the science of social psychology and inter-personal relationships in computer-mediated networked environments. Moreover, specific features and structural characteristics of communities and weblogs are taken into consideration, as well as conspicuous new technologies in the field of web 2.0 applications. Three main paths of extrapolation are scrutinised, each revealing advantages in terms of an effective and efficient identification of lead users (Fig. 2): 1. certain criteria may be better tested in an online environment, i.e., usually rather
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<td><strong>User dissatisfaction</strong></td>
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<td><strong>Speed of adoption</strong></td>
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<td><strong>User Expertise</strong></td>
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<td>Product related knowledge</td>
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<td>Frequency of use of information sources</td>
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<td>Professional background or hobby</td>
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anonymouse consumers become more visible through an active participation in web 2.0 applications; 2. certain criteria might only be able to be assessed in the online setting, i.e., users feel inhibited to reveal certain characteristics in the real-world and 3. online users may show a higher degree of lead userness, i.e., users, who are active in web 2.0 applications, fulfill certain search criteria to a higher extent.

**Conceptual Linkage–Lead-User Criteria and Web 2.0**

In the following section, the potential of web 2.0 applications will be analysed with respect to each single criterion as structured in Table 1. For each criterion, we will
provide theoretical background, elucidate its role in traditional lead-user identification and render arguments for an intensive integration of online applications into lead-user search.

**Being ahead of a market trend**

The first criterion to start our conceptual linkage is one of the two original lead-user criteria, *being ahead of a market trend*. Identifying users, who sense a certain need, before the majority of the market requires to investigate trends in an innovation field and identify the most critical ones. In a second step, users are screened for those leading these key trends (Herstatt and von Hippel, 1992; von Hippel et al., 1999). When projecting this criterion onto the online setting, we will concentrate on weblogs in particular, be they stand-alone applications or integrated features of communities.

Weblogs can be considered as the main communication tool in the web 2.0 context. For the identification of critical trends, a firm may benefit from technologies and structures of weblogs, which are conducive to trend identification in multiple ways: the strongly inter-linked nature of the blogosphere initially helps to single out weblogs with relevant content in a topical cluster by applying search engines that are specifically tailored to weblog search (Schmidt, 2006; Java, 2006; Mishne, 2006; Zerfaß and Bogosyan, 2007). Once a relevant set of weblogs is identified, the RSS technology allows for an easy and efficient surveillance by enabling users to subscribe to weblogs or sections of them and receive any updates immediately.
without having to navigate to a certain website (Hippner and Wilde, 2005; Bienert, 2007). Links from the observed set of weblogs to peripheral websites can serve as a relevance filter for a wide range of websites. This is facilitated by special features of the so-called permalinks, which unlike conventional hyperlinks, are bidirectional and offer more specified referral. Thereby, the reader can follow conversations that are spread out on several weblogs, as the blog entries refer to other entries (parts of a website), instead of just linking two websites (Glance et al., 2004; Hippner and Wilde, 2005; Schmidt, 2006; see also the conversation tracker by blogpulse). Discussions in weblogs are also encouraged by a technology called trackback that indicates at the end of a blog entry whether another weblog has referred to it. Furthermore, the spatial and temporal asynchronous weblog communication through the inherent comment feature at the end of each entry or the aforementioned trackback technology enables the leading-edge users to have an ongoing dialogue on trends without having to arrange a meeting. All of these communication features weblogs provide can help to ensure that a sufficient number of experts from analogous search fields, or those closely related, are taken into consideration for a comprehensive trend analysis (Lüthje, 2000; Pötz et al., 2005; Herstatt et al., 2007; Bienert, 2007).

Besides these weblog functions that are favourable to trend detection, the characteristic structure of weblogs shows potential to actually identify the users at the head of a market trend. Due to the reverse chronological order of the weblog entries and their allocation to categories within one weblog, a detected trend can easily be traced manually to its initiator. First approaches to automate the identification of certain types of bloggers have also been taken (Nakajima et al., 2005; Java, 2006).

Being an active participant in weblogs or communities might, as well, indicate a higher lead userness. The open nature and an easy usability of these web 2.0 applications turn them into assembly places of dynamic interdisciplinary and topical exchange of information and trends (Glance et al., 2004; Java, 2006; Kozinets, 2006; Maurice, 2007). Additionally, the structure of weblogs is search-engine friendly, which entails high ranks in keyword search results, thus providing a breeding ground for analogous approaches to a problem beyond national boundaries or limitations to expert opinions of a certain branch of industry (Herstatt, 2003; Schmidt et al., 2005; Java, 2006; Schmidt, 2006).

**High expected benefits**

The second component of the original lead-user theory is the high benefit users expect from finding innovative solutions to a problem (Urban and von Hippel, 1988; Herstatt, 1991; Lüthje, 2000; Franke and Shah, 2003; Franke et al., 2006). Three indicators have been developed to allow for a better assessment of this criterion.
Along these, the following projection of the second lead-user characteristic onto the online setting is structured.

**User investment**

In the absence of an adequate solution provided by a manufacturer, lead users will try to devise their own products or modify the existing products in order to satisfy their leading edge needs. These investments in obtaining a solution were found to be positively correlated with the benefit the user expects (Schmookler, 1966; Mansfield, 1968; von Hippel, 1988). However, user investments used to be perceptible only to a certain community, the user innovator belonged to. Therefore, this indicator could hardly be detected without conducting a survey (Ernst et al., 2004; Lüthje and Herstatt, 2004; Hienerth, 2006). Online communities have developed into platforms enabling users to reveal their ideas or innovations, for instance, by uploading drawings, virtual prototypes, CAD files or simply in discussions among the members. As a result, the indicator user investment can be more accurately and easily evaluated in an online setting.

By assessing specific visualisations of the user concepts and innovations as opposed to mere questioning of users, firms might be able to even reproduce and test user innovations (in contrast to Urban and von Hippel, 1988; Shah, 2004; Piller, 2006; Füller et al., 2007). Apart from the information on the user innovation, i.e., the user investment, the firm trying to evaluate the lead userness may also consider the opinion of other community members on the innovation, as it may be uttered in their comments. Hence, the firm’s assessment might already be supplemented by a market perspective at this early stage of the NPD.

Not only lead users might be identified online in a more reliable and less complicated way, they might as well outdo innovative users in terms of the degree of expected benefit, which directly corresponds to a higher lead userness. On account of the collective effort of innovating within an online community, users may find favourable conditions for their innovative activities and as a result, the quality of user investments may tend to be superior (Amabile, 1997; Shah and Tripsas, 2004; Tietz et al., 2005; Hienerth, 2006; see also the discussion in the section “Use experience”).

Füller et al. (2007) showed that there is often only a small number of innovative members in a community who play a key role in the collective generation of innovations. At the same time, these users proved to be widely known in the community and thus could easily be identified (Franke and Shah, 2003). Towards an automated process of identifying leading edge users, distinct user types could be recognised with respect to length, frequency and the level of postings they contribute within a thread (Henkel and Sander, 2007).
User dissatisfaction

The investment in finding a solution is cognitively preceded by a state of dissatisfaction with the existing products on the part of the user, which is the result of a negative discrepancy between the expected and the perceived performance of a product (Bruhn, 1982; Urban and von Hippel, 1988; Lüthje, 2000; Franke et al., 2006).

With regard to the indicator user dissatisfaction, potential of the web 2.0 can be found in the presumption that users would preferably express their discontent to a person in their peer group, e.g., another member of an online community which they are part of. The information ensuing from monitoring that kind of peer communication is said to be more reliable, unadulterated and unfiltered (Assael, 1998; Kozinets, 2002; Pitta and Fowler, 2005a). Online communities may also help to filter out postings from dissatisfied users that are not caused by mere ignorance or by a mistake of application, but rather reflect unfulfilled needs of leading-edge users. Utilising the self-organising effect of the communities’ bottom-up structure is important, in order to be able to efficiently cope with the sheer multitude of user contributions in web 2.0 applications at all. It is plausible that by definition, lead users should only express dissatisfaction that originates in needs experienced way ahead of the bulk of the market rather than in a lack of user experience. Again, an automation based on the length of threads and the number of users involved in a discussion could be promising (Henkel and Sander, 2007).

The indicator user dissatisfaction is also supposed to ensure that users’ general needs are transformed into specific product specifications (Lüthje, 2000). In discussions revolving around problem-solving, the community can assist specifying requirements and sustain user dissatisfaction.

Speed of adoption

Finally, the third indicator for the lead-user characteristic of high expected benefit is the speed of adoption regarding the new products. Research showed the higher the rate of adoption, the higher the benefit users expect from a new solution (Robertson, 1971; Urban and von Hippel, 1988; Rogers, 1995; Lüthje, 2004).

Again, monitoring communities or weblogs could replace the collecting of information by means of surveys. However, supposedly, the manually conducted surveillance of the web 2.0 applications is time-consuming in comparison to standardised questionnaires despite the focus on few communities and weblogs relevant to the innovation project, i.e., the search field. Users’ reports of experience with products that were recently introduced to a market may signify their speed of adoption in the same way as announcements of a future intention to purchase or verbalised impatient expectations of new products.
It appears plausible that innovative users participating in web 2.0 applications show a tendency towards adopting new products faster, i.e., they fulfill the criterion to a larger extent. A possible reason can be seen in an earlier impetus for the decision-making process leading up to the adoption, i.e., purchase of a new product (Assael, 1998; Blackwell et al., 2006). This, for instance, could happen when users gain awareness of a latent need due to the global communication and networking in online applications, e.g., when a product has already been introduced to a foreign market (Hennig-Thurau et al., 2004; Füller et al., 2007). The fast diffusion of information through weblogs and community communication and their trend-leading grassroots nature may accelerate the adoption (Gruhl et al., 2005; Java, 2006). Subsequent phases of decision-making, such as the acquisition of product information and the evaluation of alternatives (Assael, 1998; Blackwell, 2006) can also gain momentum as a result of permanent involvement in online discussions and up-to-date reports of users’ experiences (Gatignon and Robertson, 1985).

**User expertise**

Strikingly, both original lead-user characteristics rather concentrate on motivational qualities. The actual product-related abilities and the knowledge of users are not explicitly included in the original lead-user criteria. For this reason, several approaches have been taken to make users’ expertise an integral part of lead-user theory. In doing so, a distinction is made in most researches between user experience and product-related knowledge. Both criteria have been found positively correlated with the lead-user construct and users’ innovative activity (Lüthje, 2004; Lettl, 2004; Lüthje et al., 2005).

In order to provide a theoretical framework for the extension of the lead-user criterion user expertise in an online environment, the section is preceded by a brief survey of theories. We are going to utilise the core statements of the three theories in the field of social psychology, which substantiate the processes of perception and learning (Lettle, 2004): the notion of bounded rationality, the theory of social perception and the conception of absorptive capacity will be outlined in the following with a focus on the elements that have relevance for our line of reasoning.

According to the notion of bounded rationality, individuals are not able to cope with all the information in a complex environment as a consequence of the restricted capacity and resources of the human memory. In order to obtain and assimilate information from the environment, individuals will reduce the complexity of the environment by concentrating on selective domains (Simon, 1957; Lipman, 1995; Selten, 2001; Dequech, 2001; Gigerenzer, 2001).

The theory of social perception postulates that the perception is determined by a set of hypotheses, which an individual has developed through experience,
i.e., former perceptions and cognitions. If the hypotheses are confirmed by user experience, users will corroborate the set of hypotheses. Otherwise, the perceptual set might be modified, i.e., the robustness of the hypotheses might be diminished. The set of hypotheses that is constantly re-considered and adapted also dominates the part of the environment that is perceived by the individual (Bruner and Postman, 1948; 1949; Lilli and Frey, 1993; Lettl, 2004).

The conception of absorptive capacity claims that the level of prior related knowledge, which an individual has accumulated, largely influences his/her ability to absorb information, evaluate it and utilise the knowledge for new solutions to a problem. As memory development is suggested to be self-reinforcing, an expanded knowledge base and the breadth of inter-linked categories are conducive to the assimilation and use of related knowledge (Bower and Hilgard, 1981; Cohen and Levinthal, 1990).

Apart from the theories in social psychology, another notion is used to explain the potential of web 2.0 applications in terms of the identification of lead users. The conception of weak and strong ties explores the social ties among the individuals in a network, e.g., an innovative online community. This conception may bear significance as far as the transfer of user experience and product-related knowledge between individual users is concerned. It may also affect the communication of relevant information in the buying decision of an individual user. The strength of social ties between individuals is gauged on the basis of several measures: the time invested to maintain social relationships, the emotional intensity and the degree of intimacy in relationships and on the basis of the level of mutual services. The conception therefore differentiates between weak and strong ties, which both have an effect on the behaviour of the individuals. Ties of different strength have also been argued to assume contrasting tasks regarding the functioning and structure of a network. For this reason, weak and strong ties are considered to be channels for the transfer of resources (Granovetter, 1973; Wasserman and Faust, 1994; Wegner, 1995). Information or resources that have been transferred via strong ties are acquired more easily and tend to be more detailed and reliable. This is particularly favourable in the context of complex pieces of information (Granovetter, 1983, 1985; Uzzi, 1997; Hansen, 1999). Weak ties, on the other hand, give an access to information beyond an individual’s social structure, e.g., the individual is not member of a community (Granovetter, 1973, 1983; Johnson Brown and Reingen, 1987; Dodds et al., 2003; Jack, 2005; Kavanaugh et al., 2005).

**Use experience**

Use experience, as one component of user expertise, is developed by way of experiences from the repeated use of a product and therefore is primarily a matter of
a user’s time resources. It enables users to translate their dissatisfaction with solutions currently available on the market into specified requirements for the NPD by analysing problems and trialling new solutions (Weisberg, 1986; Alba and Hutchinson, 1987; Lüthje, 2000; 2004). The criterion use experience proved to be able to distinguish between innovating and non-innovating users and was found to positively correspond with lead userness (Franke and Shah, 2003; Lüthje, 2004; 2005).

In view of the extension of the criteria in the context of web 2.0 applications, the collective use experience should play a pivotal role. The individual in a community or weblog contributes to this experience based on a certain extent and is granted access in return by means of the interaction and communication within the network (Sawhney and Prandelli, 2000; Nambisan, 2002; Hienerth, 2006; Kolbitsch and Maurer, 2006). In the following, we will alter the angle from an individual to community-based when scrutinising the potential of the web 2.0. Particular attention will be directed toward any intensifying effects on the extent to which users fulfil the criteria of expertise.

Individuals have been found to preferably avail themselves of personal contacts as a source of information (Katz and Lazarsfeld, 1955; Allen, 1977; Kozinets, 1999; Cross et al., 2001; Godes et al., 2005). The chance to acquire tacit knowledge resulting from other users’ time-consuming accumulation of use experience via trial-and-error may account for this behaviour (Shah, 2000; Lüthje et al., 2005; Tietz et al., 2005). Research on offline user communities, for instance, revealed that in 68% of all innovation projects at least three more members were involved besides the innovator. In 21% of all the cases, at least six other members were part of the team (Shah, 2000; Franke and Shah, 2003; Kozinets, 2006; similar Hienerth, 2006). In order to cover their need for information in various domains, users may take advantage of the resources of the community. Hence, users are required to activate social ties and divisions of their network according to their information endowment (Wellman and Gulia, 1999; von Hippel, 2005).

Making use of the collective experiences of a community may provide the means to overcome the cognitive limits, a single individual is subject to (Sawhney and Prandelli, 2000; Butler et al., 2002). In online communities, individuals share essential resources, be they of cognitive, emotional or material nature (McAlexander et al., 2002). This, for instance, occurs when questions and experiences are posted and discussed online, which may be regarded as a “meta” trial-and-error process on the level of a community. Members of a community may not only test and optimise products that they have created themselves, but also innovations generated and revealed by other members (Shah and Tripsas, 2004; Hienerth, 2006; Piller, 2006; Füller et al., 2007). These considerations can be substantiated by the theories in social psychology described beforehand.
The significance that might be ascribed to the collective assimilation, evaluation and utilisation of use experience can be underpinned by the conception of absorptive capacity. Owing to a deeper and more widely diversified knowledge base, i.e., a base of experiences, communities’ absorptive capacity may by far surpass that of an individual (Cohen and Levinthal, 1990; Wegner, 1995; Harhoff et al., 2003; Lüthje et al., 2005). A community’s focal interest can be assumed to provide a common knowledge base its members have and thus make it easier for the members to comprehend and exploit new and more specific knowledge, which other users contribute (Cohen and Levinthal, 1990). Due to the more intense interaction among the members of communities, which is facilitated by the community features such as the member profiles, electronic communication and structured forums, a system develops in which individuals increasingly develop the so-called transactive memory. This is knowledge members gain of other members’ fields of expertise. The more extensive users’ transactive memory is, the better their access to the community’s knowledge pool will be (Wegner, 1987; Wegner et al., 1991; Thompson and Fine, 1999; Brandon and Hollingshead, 2004). The knowledge resulting from use experience may, for instance, be transferred via an open source software and CAD-files, as could be observed in a kitesurfing community. Based on the information and expertise accumulated and revealed as CAD-files by the community members, other users are able to resume and further the tests and developments (Piller, 2006). This collective innovating effort allows users to substantially capitalise on other users’ expertise that would not have been available to them otherwise, i.e., in an offline context (Preece and Maloney-Krichmar, 2003; de Valck, 2005).

The theory of social perception gives rise to the assumption that in contrast to an isolated individual, a radical re-orientation is more likely to take place in a community as a result of its larger set of hypotheses. Even though a single member’s set of hypotheses may be exceptionally robust and thus control the individual’s cognitive processing, another member characterised by a less robust perceptual set might just reject the hypothesis, once the experience is shared with the community. Any favourable outcome ensuing from that change of perspective can be expected to be disseminated within the community on account of the interaction among the community members. Consequently, the entire community’s set of hypotheses will be re-adjusted and the innovative activities re-aligned with the latest findings. This characteristic may significantly increase the likelihood of breakthrough innovations to prevail and thereby make communities the preferred environment for lead users all the more.

If users focus on specific domains in a field of application by reason of reducing complexity — as claimed in the notion of bounded rationality — they are able to selectively obtain and assimilate information. At the same time, their decisions are
pre-disposed to be sub-optimal. For the processing of information inside communities, an idealised scenario could be delineated that may, to some extent, resolve the cognitive dilemma: users may supplement the innovative approaches of other members with complementary information from their respective domains in a processed and aggregated form and make it accessible to the community again (Franke and Shah, 2003; Lettl, 2004; Lüthje et al., 2005; Filler, 2006). The technological possibility to permanently link single contributions (cp. Being ahead of a market trend) and archive them as connected units of knowledge appears to be conducive to this scenario. Besides, the information could be easily retrieved harnessing community search engines screening the archives (Hagel and Armstrong, 1997; de Valek, 2005; Dellarocas and Narayan, 2005; Tietz et al., 2005). This scenario would entail a higher level of information and thus higher lead userness among the community members.

On the whole, the interaction of users inside communities seems to have considerable potential to overcome the cognitive shortcomings as depicted in the theories of social psychology. Powerful communities, as a whole, can draw on significantly larger human resources of their members, which is particularly valuable in the context of use experience resulting from of laborious trial-and-error (Franke and Shah, 2003; Lüthje et al., 2005; Hienerth, 2006; Baldwin et al., 2006; Füller et al., 2007). Hence, it is not surprising that community-based internal resources could be found to have a positive effect on the likelihood that users innovate as well as on the commercial attractiveness of user innovations (Franke et al., 2006).

Means of communication are required in order to access a community’s knowledge base comprising each member’s expertise. (Wegner, 1987; Wegner et al., 1991; Thompson and Fine, 1999). We will now take a closer look at the channels of communication and try to identify those users in a community, who profit most from collective use experience. The following considerations are based on the conception of weak and strong ties.

The number of strong ties plays a pivotal role as far as a member’s access to the collective knowledge is concerned (Wegner, 1987; Franke and Shah, 2003; Cross and Sproull, 2004; Jack, 2005; Schulz, 2006). Use experience is characterised by its high complexity as a result of the tacit knowledge that constitutes it and the related product knowledge required to underpin these experiences (Polanyi, 1958; von Hippel, 1994; Nightingale, 1998). This complexity demands a strong social relationship among the parties of knowledge transfer (Hansen, 1999). Strong ties have further relevance regarding them as links into more distant social spheres of a user’s network, i.e., second-degree relationships (“friends-of-friends”) (Jack, 2005). The more strong ties members can draw on, the more use experience they will be able to acquire, which positively correlates with the user’s lead userness
The inter-relation between the strength of social ties and users’ innovativeness is also supported by research in offline communities that showed that innovating users spend 32% more time with other members than non-innovating users (Franke and Shah, 2003).

In many cases, social relationships in online communities may be categorised as weak ties owing to the virtual way the relationship is initiated and cultivated (Kraut et al., 1998; Wellman and Gulia, 1999; Andersson et al., 2007). However, one has to bear in mind that some of the virtual relationships are the online counterparts to solid real-life relationships and, thus, are to be considered strong ties. Weak ties may also serve as bridges into socially distant clusters. However, in contrast to the strong ties, they provide direct relationships instead of forming a connection through a strong tie. Thereby, weak ties are more likely to produce non-redundant information as opposed to rather identical information obtainable from a usually very homogeneous group of strong ties (Burt, 1992; Cross and Sproull, 2004). One way to assess a user’s network in terms of weak and strong ties could be the list of contacts, which is featured by most online communities. Nonetheless, these lists usually do not differentiate between the strengths of ties, which remain to be evaluated based on the degree of interaction between two members.

Studies on users’ expertise sometimes refer to the frequency of use, the total period of use and the number of different disciplines as measures indicating use experience (Lüthje, 2004; Tietz et al., 2005; Jeppesen and Frederiksen, 2006). These indicators may offer further perspectives to elaborate the potential of online lead-user identification.

**Product-related knowledge**

The second criterion constituting a user’s expertise is the **product-related knowledge** that comprises a product’s way of functioning as well as knowledge of material, processes and technology. It empowers the user to convert product requirements into preliminary solutions (Lüthje, 2000). Between the **product-related knowledge** and users’ innovative activities as well as lead userness, a positive relationship has been detected (Lüthje, 2004).

Instead of relying on users’ self-appraisal (cp. User investment) or easily accessible information, e.g., the academic degree of a user in surveys (Herstatt and von Hippel, 1992; Lettl, 2004; Hienerth et al., 2007), firms can derive information from users’ online activities. With the projection of this criterion into the online setting, the assessment of users’ **product-related knowledge** is supposed to be notably facilitated. Users rendering assistance to other members of a community can be logically assumed to have greater **product-related knowledge** than those members who enlist advice. This assumption has been validated by research showing that 50% of the
innovating users compared to only 10% of non-innovating users offered support to other members, while 40% of the supporting users were considered to have an expert knowledge (Franke and Shah, 2003). Users issuing newsletters or moderating discussion forums may be another sign of extensive inherent product-related knowledge (Seufert et al., 2002).

The frequency of use of information sources and the professional background or hobby could be identified as indicators of the extent of product-related knowledge, which are to be briefly discussed in the following. As far as the first indicator is concerned, similar collective effects and consequences should be present for product-related knowledge as have been discussed for the criterion use experience (cp. Use experience). In NPD, product-related knowledge in several domains is often a prerequisite for the innovative combination of a product’s various components (Tietz et al., 2005; Piller, 2006). However, having profound expertise in several domains is rather unusual due to the long durations of the academic programmes. This is why research has predominantly focused on a user’s professional background or hobby (Lüthje et al., 2002; Lüthje, 2004; Lüthje et al., 2005; Jeppesen and Frederiksen, 2006). Knowledge that is acquired within the bounds of one’s profession or hobby is not involved in this dilemma as the local information ensuing from the pursuance of a profession or hobby is available to them at hardly any cost, i.e., the information is not “sticky”. The low-cost procurement of information is owed to the fact that it is a by-product of the necessary pursuance of a profession or the enjoyable practice of a hobby (von Hippel, 1994; Morrison et al., 2000; Lüthje et al., 2005; Füller et al., 2007). This phenomenon is also consistent with the theory of bounded rationality stating that users focus on one or very few domains, particularly on one they are already proficient in, as a means to reduce the complexity (Simon, 1957; Selten, 2001; Dequech, 2001).

Research revealed that more than 70% of the innovating users had a profession they could transfer knowledge from for their innovative activities as opposed to 34% of non-innovating users (Lüthje, 2004). The example of a scientist working in the field of ergonomics and biomechanics, who used his/her professional knowledge to design a mountainbike frame in his/her spare time perfectly illustrates the effect of background knowledge on innovative activities (Lüthje et al., 2005).

In online communities “sticky” information can be easily transferred, i.e., made available to other members by way of visualisations that are uploaded (Ogawa, 1998; van Hippel, 1998). For this reason, online communities may have an edge over their offline equivalents that might reveal “sticky” information via face-to-face communication, however, only to a very limited number of members. A firm’s online search for lead users with a background conducive to the innovation project may also be eased as a result of the extensive availability of innovation related
information, i.e., in user profiles or forums, as well as advanced search capabilities in online communities (O’Murchu et al., 2004; Kolbitsch and Maurer, 2006; Kho, 2007; Lampe et al., 2007). The enormous revelation of information in online communities may further allow firms to select lead users by cumulatively combining users’ expected benefits and backgrounds according to the respective search field. Provided that the search field of a lead-user project is described as “safe mountainbikes”, the firm might search for users, who pursue exceptionally dangerous mountainbiking disciplines and at the same time are medical doctors (Lüthje et al., 2002; 2005).

User motivation
User motivation can be generally divided into extrinsic and intrinsic motivation.

Extrinsic motivation
Extrinsic motivation arises from the consequences of a user’s activity and its attendant circumstances, i.e., monetary incentives or the benefit of using an innovation. These work as an impetus for innovative activities from the outside (Amabile, 1997; Frey, 1997; Lettl, 2004; Reichwald et al., 2004). The motivating power of benefits resulting from the utilisation of innovative products is already taken into account in the form of the second lead-user criterion high expected benefit (cp. High expected benefit). The effect of monetary incentives on users’ motivation could not be confirmed in several studies. A possible explanation for this finding might be the suppression of intrinsic by extrinsic motivation (Herstatt and von Hippel, 1992; Lüthje, 2000; Jeppesen and Frederiksen, 2006; Pötz et al., 2005). For this reason, this kind of extrinsic motivation will not be further analysed.

In the context of communities, users’ commitment to innovative activities of other members is evident. This being the case, social motives should be taken into consideration as the causes of extrinsic motivation. Users’ behaviour is assumed to be under the influence of other members, so that the community develops a dynamic that may give a boost to users’ motivation to innovate. Reasons for this could be the expectation of recognition or altruistic motives (Lerner and Tirole, 2002; Lakhani and von Hippel, 2003; Reichwald et al., 2004; Jeppesen and Frederiksen, 2006).

As can be seen from the example of an open-source development, user interaction and participation may have a strong motivational effect on users (Lerner and Tirole, 2002). This, however, is a phenomenon of the community as a whole, which cannot be transformed into a criterion on the level of a single user. Consequently, a user’s membership of and commitment to a community can only serve as indicators of higher motivation per se, instead of allowing for differentiation between users’ degree of motivation. Relevant communities may be assessed as to their effect on
users’ extrinsic social motivation in a first step. Then, users of favourable communities may only be further considered. (cp. Online commitment and participation as a pre-requisite of lead userness).

**Intrinsic motivation**

Intrinsic motivation results from the activity itself conveying a feeling of enjoyment, exploration and creativity to the users and enabling them to make full use of their potential (Zimbardo, 1992; Ryan and Deci, 2000; Reichwald et al., 2004). The assumption that high intrinsic motivation has a positive influence on a user’s innovative activities could only be partially confirmed in studies (Lüthje, 2000; Lettl, 2004; Lakhani, 2006; Jeppesen and Frederiksen, 2006). In the light of the analytical approach of this study, we will still extend this criterion to the online context. In contrast to the extrinsic motivation, intrinsic motivation can be examined on the individual level of a single user. In the context of web 2.0 applications, users’ commitment could be assessed according to their participation to the community, i.e., revealing information on innovation projects or assisting other members (Franke and Shah, 2003; Füller et al., 2007). It may help to segment a community population based on their commitment to the community and involvement in the topic of the community (Kozinets, 1999; 2002; Hemetsberger, 2001).

Moreover, individuals who, on the whole, firmly believe that certain outcomes are for the most part a result of their own actions, i.e., individuals with a high internal locus of control, tend to show high intrinsic motivation and creativity (Rotter, 1966; Leone and Burns, 2000). The construct of the locus of control is assumed to experience further reinforcement in the context of web 2.0 applications. These often have bottom-up organisational structures instead of being organised by a higher entity. Thus, users may increasingly embrace the role of a “producer” determining their own activities, i.e., the frequency and type of contributions (Hemetsberger, 2001; Bunz, 2006; Krempfl, 2006; Kolbitsch and Maurer, 2006). This experience of far-reaching control might positively influence both a users’ motivation and lead userness (Pitta and Fowler, 2005b).

**Extreme needs and circumstances of product use**

Extreme needs and conditions, a certain type of user may be confronted with, are rather a recommendation for a promising field to search in than search criteria themselves (von Hippel et al., 1999; Nortel Networks, 2000; Herstatt, 2003; Lüthje and Herstatt, 2004; Schild et al., 2004; Lettl, 2004; Lüthje et al., 2005). Nevertheless, this recommendation will be extended to the online environment and examined in this context.
Expecting users to display a more intense and strongly motivated search behaviour under extreme conditions seems to be cogent. A higher pressure to find a solution to a problem due to the possible fatal consequences of product use may support this assumption as well as the users’ open-mindedness towards new approaches. The latter is attributed to users in extreme situations, as they typically have a more open set of hypotheses and are therefore less impeded to innovate (Lettl, 2004).

Extreme users’ intense search behaviour is likely to increase the probability of them tapping the resources and information offered by web 2.0 applications and searching for the few like-minded users that are also confronted with similar extreme conditions (Kolbitsch and Maurer, 2006; Schmidt, 2006; cp. Online commitment and participation as a pre-requisite of lead userness). Since extreme users will try to make use of a community’s resources as much as possible, a higher actor degree centrality (Wasserman and Faust, 1994) and stronger commitment of users to a community might be further effects of the onerous external conditions that the extreme users face. Hence, frequent and informed contributions as well as a high number of social ties in a community should be the characteristic of extreme users.

Users with extreme needs may also be more easily or even solely identifiable in web 2.0 applications, since the problem they face might be extremely sensitive or stigmatising. In this case, users will rather prefer not to disclose any information despite their desperate search for a solution. Examples can be found in the field of diseases, disabilities and other sensitive subjects that require to recruit lead users from stigmatised segments of the society (Prügl, 2006). Under these conditions, communities as well as the weblogs enable users to interact and reveal information and at the same time remain anonymous. Still, it is feasible for a firm to gain valuable insights or even contact to extreme users via their online alias. This potential of an online lead-user search is crucial, as invaluable information can be obtained that otherwise would remain inaccessible.

**Opinion leadership and word-of-mouth**

Word-of-mouth is the informal communication of ideas, comments, opinions and information between two people, none of whom is a firm marketing its products (Godes et al., 2005; Blackwell et al., 2006). In the context of web 2.0, information is transmitted electronically by making it accessible online (Hennig-Thurau et al., 2004). Opinion leaders are senders of information in a word-of-mouth process and are positioned to influence other individuals (de Valck, 2005; Anderrson et al., 2007).

According to the conceptual framework, we focus on the identification and integration of lead users for the purpose of ideation and conceptualisation in the fuzzy front end of the innovation process (cp. Conceptual Framework). Despite this focus,
we will briefly examine lead-users’ ability to support corporate marketing of new products in the diffusion phase.

There are a variety of reasons why we attach importance to lead-users’ opinion leadership. The marketing of breakthrough innovations that tend to be initially perceived as complex by customers, needs to offer assistance and guidance for customers in order to break with old habits of product usage (Atuahene-Gima, 1995; Veryzer, 1998). By virtue of their excellent product-related knowledge and use experience, lead users seem to be pre-destined for the role of opinion leaders (Urban and von Hippel, 1988; Schreier et al., 2006). Furthermore, the lead-user characteristics being ahead of a market trend and speed of adoption constitute the essence of opinion leadership (Rogers and Shoemaker, 1971; de Valck, 2005). By the time the majority of consumers sense a certain need, lead users will already have gained extensive experience and may accelerate the diffusion of a new product (von Hippel, 1986; Herstatt, 2004).

It becomes obvious that opinion leadership is already contained in the original lead-user criteria. This is also confirmed by the studies showing that lead userness and users’ innovative activities are positively correlated to a user’s opinion leadership (Franke and Shah, 2003; Morrison et al., 2004; Schreier et al., 2006). As a result, opinion leadership can be regarded as a by-product of lead userness.

Yet, we will point out a few additional criteria that might help to identify lead users or relevant communities (cp. Online commitment and participation as a prerequisite of lead userness) in the light of web 2.0 applications. First and foremost, we will concentrate on those criteria that derive from a user’s membership of an online network and are generalisable rather than those that are tailored to a specific innovation project.

A large number of social contacts appear to be indispensable and essential to opinion leadership (Katz and Lazarsfeld, 1955). Communities can be considered networks that allow the informal transmission of information and consist of multiple relationships between their members (de Valck, 2005). The size of a user’s network is decisive with respect to both dimensions, the total number of members and a user’s direct contacts. Determining the size of offline networks is susceptible to mistakes as it is usually not publicly manifest and based on surveys (Katz and Lazarsfeld, 1955; Milgram, 1967). The size can be easily and more reliably determined in online networks based on the available media data that also include further details, such as page views, unique visitors or growth rates. On the level of individual users, direct contacts are often visible in each user’s profile.

Additionally, online users might tend to have greater opinion leadership on account of the the common ground community members have and the larger number of contacts that can be reached at low cost (Moon and Sproull, 2001; Kozinets, 2002; de Valck, 2005).
In terms of the strength of social relationships among the members of a network, both weak and strong ties have different positive effects on the diffusion of information in the word-of-mouth process (Milgram, 1967; Granovetter, 1983; Constant et al., 1996; Bickart and Schindler, 2001; Jack, 2005). Consequently, differentiation according to tie strength generally may not help to identify lead users.

Online commitment and participation as a pre-requisite of lead userness

The projection of search criteria into the web 2.0 as discussed in the previous sections showed that the identification of lead users yields advantages when the criteria are tested in the environment of a community or in the blogosphere. Thus, it might even be reasonable to go so far as to oblige a user to be a member of a community or to participate in a weblog as a pre-requisite of true lead userness. A less drastic course of action would be to set the starting point of lead-user search in the conducive environment of a community or the blogosphere. After all, the key question has to be posed: can there be true (high) lead userness without a user’s commitment to or participation in an online application or should it become a constituent precondition for lead userness?

A possible line of reasoning in favour of the suggested incorporation of users’ online-presence as a pre-condition of lead userness could be as follows: the users’ high motivation is an essential part of lead-user theory and found expression in the component high expected benefit (cp. High expected benefit). It is claimed that a lead user, who is substantially dissatisfied with available products in the market, will tremendously invest in obtaining solutions to his/her strong needs (Urban and von Hippel, 1988; Franke et al., 2006). If a user limits these search efforts to the offline environment, not drawing on the enormous resources, i.e., the support or collective knowledge of a community available online, it may be questioned whether true lead userness can be ascribed to that user.

Even though critical voices may claim that this pre-requisite entails a pre-selection of users that is too rigorous and restrictive, this concern is more and more resolved in view of the great and constantly increasing popularity of the online communities and weblogs among the innovative users. Nevertheless, choosing the online context as a starting point for lead-user search considerably restricts the search area. This is particularly true for the screening search method that does not allow references beyond the sample of users inspected, as opposed to the pyramiding search process (Prügl, 2006).

Acting on the suggestion to make online activity an integral part of lead-user theory, a two-fold process is necessary in which relevant communities or weblogs are selected first in order to identify lead users from these applications in a second step (Kozinets, 2002; Franke and Shah, 2003; Füller et al., 2006). In recent projects
applying the lead-user method, a similar approach was taken. A search procedure called broadcasting was employed, selecting communities, forums or threads to “broadcast”, i.e., formulate and reveal a problem to its users (Hienert and Pötz, 2006; Hienert et al., 2007). Depending on what level of the website structure (i.e., how deeply rooted), the problem is “broadcasted” (e.g., homepage, sub-categories, single threads), the sample of users to start with the search is wider or narrower.

As regards to the identification of relevant communities and weblogs, firms may either investigate the online landscape (cp. Being ahead of a market trend) or enquire relevant applications of experts and already identified lead users, harnessing the same networking technique used for the lead-user search (Prügl, 2006).

Most important of all to the selection of relevant online applications seems to be the specific search field of an innovation project (von Hippel et al., 1999; Herstatt et al., 2007). The topic or main interest of a community or weblog (e.g., a certain product or hobby) could serve as an aid to orientation and be an indicator of users’ expertise. However, this topical selection of web 2.0 applications can only be carried out for each individual innovation project. Hence, in the following section, we will only take a brief look at criteria that are generalisable and may be considered for any lead-user project.

Research in communities showed that those in a less competitive environment tend to consist of users, who are more likely to assist other members and freely reveal information (Franke and Shah, 2003; von Hippel, 2002). With mutual assistance and free revealing mainly accounting for the superiority of online communities in comparison to single users or offline communities, it appears to be promising to opt for communities characterised by the limited competition or merely friendly rivalry (Jeppesen and Molin, 2003; Schulz, 2006; Hienert, 2006; Jeppesen and Frederiksen, 2006; Füller et al., 2007).

Generally, there is a positive relationship between the size of a community and the efficiency of information search within the network (Baldwin et al., 2006; Hienert and Pötz, 2006). This correlation can be explained by the powerful collective effects and the higher probability of identifying users with an exceptionally high lead userness in large communities.

User postings to a bulleting board with a minimum level of quality as well as a certain degree of interaction among members also seem to be valid demands ensuring that a community is frequently visited and intensely used by its members (Füller et al., 2007).

In a second step, lead users are identified in the selected online applications via search methods (Prügl, 2006). Pyramiding search might, for instance, be modified as to deliberately choosing a community member as the person to commence the search with. With respect to the screening search approach, it may help to select
a group of people inside a community or sub-community for the initial sample of users that is to be screened.

**Conclusion and Future Research**

This analysis aimed to conceptionally elucidate the potential of web 2.0 applications for the identification of lead users and demonstrated varied starting points towards a utilisation of this potential. As a result, certain cases and scenarios could be identified in which online-situated search efforts might be superior to the offline equivalent.

With regard to the first path of extrapolation (cp. Conceptual framework; Fig. 2), potential has been discovered allowing for the better testing of criteria. Firstly, scenarios became obvious in which criteria could be tested more comprehensively. For instance, it was demonstrated how the criterion *user investment* could be supplemented by a qualitative component. Secondly, the assessment of the extent to which a user would fulfill a criterion can be assumed to be more reliable when tested in online applications. The users’ expressions of dissatisfaction with existing products, for instance, were found to be rather unfiltered and genuine in online communication with their peers (Kozinets, 2002). Besides, instead of relying on users’ self-appraisals, their *product-related knowledge* and investments in obtaining solutions can be evaluated based on the extent to which they offer assistance to other members (Franke and Shah, 2003) or reveal visualizations and data online (Shah, 2004; Piller, 2006; Füller et al., 2007). Thirdly, criteria may also be more patent when put to test. Extensive information on hobbies and professional background in users’ profiles makes their *product-related knowledge* very obvious to a firm (Kolbitsch and Maurer, 2006; Kho, 2007; Lampe et al., 2007). Users publishing online newsletters or moderating relevant discussion forums might also indicate the *product-related knowledge* that they have accumulated (Seufert et al., 2002). It stands to reason that all these advantages would enable firms to profile lead users in more detail and thus choose lead users that are particularly suited to a specific innovation project (Lüthje et al., 2002; 2005; Hienerth et al., 2007). The analysis also offered explanations why the search for lead users in web 2.0 applications might be able to significantly reduce the anonymity common in consumer markets. However, the analysis also implied that the qualitative gains are often accompanied by additional expenditure.

The theoretical evidence that certain criteria may solely be ascertainable in web 2.0 applications turned out to be of secondary importance. This scenario is likely to be found only in certain industries that meet very sensitive and extreme consumer needs, for instance, in the health-care sector. Users often feel more comfortable
revealing sensitive information as anonymous members of a community (Prügl, 2006).

Due to the massive resources and collective knowledge of communities, scenarios could be delineated in which online users have a higher lead useriness than the individuals using a product solely offline. This scenario appeared to be the most striking when testing users’ expertise, i.e., use experience and product-related knowledge (Franke and Shah, 2003; Shah and Tripsas, 2004; Hienerth, 2006; Piller, 2006; Füller et al., 2007).

On account of the aforementioned advantages of lead-user search in an online environment, firms may be encouraged to further extend search locations to web 2.0 applications. This may help the lead-user method to become established as a standard tool for the NPD.

A crucial limitation of this analysis is its entirely theoretical approach. The study is based on a scrutiny of search criteria used in the literature on user-centric innovation in order to identify and integrate innovative users. The potential of lead-user identification in the context of web 2.0 applications is inferred from the existing criteria that are projected into the online environment referring to various concepts. Future research will have to validate the potential in lead-user projects and examine the efficiency of online lead-user search. This is especially necessary considering the way of proceeding, which mosaicked individualities that were observed in specific web 2.0 applications, but may not be generalisable. The potential might thus vary depending on the industry or product category in which a firm’s innovation project is situated in as well as on the number of relevant online applications in the respective search field (Lüthje, 2004). Furthermore, the users’ willingness to freely reveal information and assist one another may differ depending on the life cycle phase of the community at the time of observation (Shah, 2000; Franke and Shah, 2003; Hienerth, 2006).

Additionally, the analysis came to the conclusion that future lead-user projects will have to seriously consider whether it might be necessary to integrate a user’s online commitment and participation into the lead-user construct by making it a pre-requisite for true lead useriness. This step would give rise to further questions revolving around the identification of the relevant web 2.0 applications. Hence, future research might start with a systematic analysis of lead-user projects that have used broadcast search, since this method has basically established users’ online commitment as a pre-condition of lead useriness.

References


