



Identifying Lead Users for User-Centered Design (UCD) in Sports Product Development [†]

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Abstract: There is great benefit for small medium enterprises (SMEs) and startups to utilize lead users in product development. By utilizing lead users companies can make products that are more commercially attractive and better accepted in the market. However, identifying lead users has traditionally been a difficult and expensive task. In the past, lead users have been found through time consuming personal networking, telephone interviews, mail questionnaires and data mining of often large user bases. This paper proposes that identification can be made more efficient by adapting some of these techniques, through taking a digital approach using existing social media communities such as those on Facebook. It is proposed that using social media application programming interfaces (APIs) could allow what used to be reserved for large multinationals, could be made accessible to SMEs and startup companies without extensive resources.

Keywords: lead user; identification; social media; product development; UCD; user-centered design; sports technology; SMEs; API; Facebook

1. Introduction

Lead users are users who face needs or problems ahead of the general market [1]. A lead user can be a company, organization or individual [2]. Some lead users will actively create solutions to the problems they encounter to address their own needs [3]. Their tacit knowledge can be a valuable source of product ideas or concepts for companies developing products in their respective fields [3,4]. Utilizing lead users in user-centered design processes can have the benefits of creating more relevant products, better diffusion and acceptance of products in the market [5] and products that are more commercially attractive [6]. This paper looks into leveraging lead users, that can be of benefit to SMEs [7,8].

Lead user involvement is being utilized by large multinational organizations to develop products. Some well known examples include 3M, with the development of a breakthrough surgical drape [2]. The sports industry is well suited to lead user driven product development as sports activities have high levels of user innovation [3,9]. Successful lead user product development can be seen in examples such as Hollowform kayaks and the modern squirtboat whitewater kayak between the 1970's and early 2000's [9–11].

User involvement is achieved through several different means. Examples include; physical interviewing lead users for new product ideas or features, phone interviews, email contact and social media interaction [2,12]. Lead users have been described as 'rare subjects which are difficult to detect [2,13]. A major challenge in utilizing lead users for product development is therefore in identifying them [2]. Reasons behind this difficulty include that a company actively seeking to use lead users, has to search for a very small number of subjects in an often vast user base. Product users no matter

the fields and industry, are often spread over large geographic areas and in very large numbers. The focus of this paper will be in validating the need for new lead user identification tools. By improving upon existing tools and adapting new methods of identification, companies, especially SMEs, will be able to engage lead users more easily. World leading companies, such as Nike and Patagonia [4] with large annual revenues, can have dedicated lead user experience staff. They also have the resources to spend on extensive user experience research. SMEs and startups do not have these available resources to spend large on lead user searches and programs within their product development processes. Improved identification tools could reduce the cost, time and resources involved in finding these lead users. This would allow resources to be better spent on obtaining the benefits associated with using lead users in a product development setting. By making lead user tools accessible and affordable to SMEs and startups, it is anticipated that they will be better able to develop more commercially attractive products [6], by being able to use lead users in their processes. In recent years lead user literature has begun exploring the interaction and placement of users within a social media context. It is known that lead users can be found in community groups. These community groups can be physical clubs, online web forums and more recently organized social media community groups.

2. Methods

The research methods used in this study involved a review of current literature, with the intention of exploring current methods of lead user identification, especially from a social media perspective. A summary of the current methods was prepared with a focus on identifying inefficiencies and problems associated with these tools. Finally, a preliminary search was undertaken to try and find examples of suitable organized social media community groups.

3. Findings/Results

Lead users are identified primarily by two main characteristics. These being:

- “Lead users face needs that will be general in a marketplace—but face them years or months before the bulk of that marketplace encounters them” [1] and,
- “Lead users are positioned to benefit significantly by obtaining a solution to those needs” [1]

The existing methods of lead user identification below primarily aim to draw out users with the above definition from a large pool of market users. This search for lead users has seen a shift in recent times. While traditionally, before social media was prevalent as a medium accessible by society, many lead users searches would be conducted manually mainly through mass screening drives and networking. In the last decade these searches have been able to be performed online due to an increase in adoption of social media in society. Summarized below are several traditional, widely used (within lead user identification) methods as well as some newer more recently developed methods that use the technical back end of social media such as modern data mining techniques and application programming interfaces (API) to identify lead users.

Mass screening has been a traditional common approach to identifying lead users [13]. This method involves screening a large customer or user base with the aim of identifying those with desired traits or characteristics. An example of this identification method is given in Von Hippel’s book “The Sources of Innovation” [14]. Von Hippel describes that lead users were sought in the development of a new PC-CAD system and the identification method used was through formal telephone questioners. Through a series of semi-structured questions asked by researchers, users were filtered depending on their responses [12]. Due to lead users being a small proportion of a given population of users, and user populations being proportionally very large, screening can be very inefficient in terms of time and cost [12,13,15,16]. This inefficiency can be broken down into low sample efficiency, high search costs and a reliance on the self-assessment of respondents [13].

Pyramid networking as a method of identifying lead users through networking [1][16]. The pyramid method involves contacting users within a given market and questioning them on who they regard as a leader in the field or more knowledgeable on a subject than they are. This person is then contacted and the same questions asked until a lead user with a high level of subject experience and

knowledge is found. An example is shown in Figure 1 below [2]. Medical imaging lead users were being wanted for information input into the development of a new medical imaging product. Pyramiding not only allowed identification of lead users but, these high-level users can often recommend users in other fields or knowledge areas that may also be beneficial to the product developer. The figure below depicts the process with lead users at the top of their knowledge area pyramid.

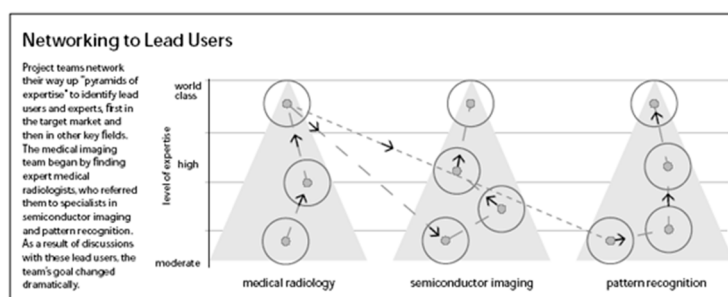


Figure 1. Pyramid Networking, 3M Example.

Traditionally, companies and product development professionals would interact and reach out to these users with analogue/manual methods to build these network pyramids. Communication mediums such as phone call interviews and postal questionnaires were commonly used. While effective, these methods have two major limitations in that they are very time consuming and of high cost due to the human resources that are required [12,16]. The phone calls or letters would be used to draw out these otherwise unknown network connections between users. However, in recent times with the widespread social adoption of social media platforms a lot of the pyramid linking can be achieved through the social media platform itself. Some platforms (such as Facebook) allow users to create and join communities, which often consist of users that share common interests or attributes. Sometimes these groups are also based on a user's geographic location. Identifying lead users has been widely studied [2,14] already prior to social media becoming as utilized and developed as it is now. Growth in social media usage in the past two decades has accelerated the development of methods that utilize social media tools for identifying lead users [12,13,17]. Netnography is an identification method that involves combining the recognized study of ethnography, with the internet [13]. As defined by Belz, "Netnography adapts ethnographic research techniques such as observation to study cultures and communities that are emerging through computer mediated communication." [13].

Adapting traditional fields of research, such as ethnography, with the modern internet tools such as social media API's gives some key advantages over traditional methods. The time and cost of data mining can be significantly reduced as it can be performed autonomously using algorithms and software which is tuned to identify specific user characteristics. However, there are still significant search costs involved in the training of the researchers to be able to understand the behaviors and language of the target user base or community to a deep level. As discussed above, Belz [13] identified that another shortcoming of data-mining in a traditional sense was the relying of a user's self-assessment. By gathering user attributes and trends through social media, this reliance on self-assessment by a user is not required. A recent study on the social media lead user identification was published, proposing a system of identifying lead users, known as Fast Lead User Identification (FLUID) [12]. This system was developed to be used with Twitter, a social media platform that allows users to post messages (known as tweets) that are restricted to 140 characters [18]. FLUID screens users' Twitter posts and uses pre-determined key words or sentence patterns to identify potential lead users. As well as post content, the algorithm is also able to filter based on geographic location, date posted, language and more. FLUID was used as a Java based tool which consisted of the following primary processes of Keyword formulation, Data collection, Data Pre-processing, Classification and Validation as the primary steps. The resulting output is a user dataset classified into lead users, or non-lead users.

Social Media Search

Product users often found in communities [19]. Users who participate in sports can often be found in online social media communities that allow grouping functionality. For example, popular social media platform Facebook allows users to join (subscribe to) groups or pages [20]. Groups allow member communication and content sharing, whereas pages enable organizations to communicate with subscribers but allow little in the way of communication from the subscriber back to the page. A page is open to subscriptions by any user, however a list of subscribed users is not publicly available. Groups are sometimes open however others require a subscription (join) request to be approved by a group administrator. A list of groups subscribers (members) can be viewed by a non-member unless this option has explicitly been disabled by the groups administrator. Access to list however, requires a Facebook account. As an example of how these member lists can be accessed, the author did a Facebook search for online community sporting groups on Facebook, for subscriber lists that can be openly accessed. Backcountry skiing was chosen as the topic (search term), and several groups were found based in different locations. The below table (Table 1) shows that large groups of Facebook users with a common interest and in a concentrated geographic location can be found with little effort or resources.

Table 1. A Facebook group search for Backcountry Ski communities.

Group Name	Location	Members	Member List Open/Accessible?
Alaska backcountry Ski Addiction	Alaska, USA	3007	Yes
Niseko Backcountry 16/17	Niseko, Japan	487	Yes
Queenstown Ski Touring	Queenstown, New Zealand	1866	Yes

4. Discussion

The search of the literature outlined different traditional analogue methods for lead user ID, however there has been limited research and developments specific to identifying lead users through social media platforms. A recent system that has been developed, FLUID uses API to filter user content which is specific to Twitter. Twitter is limited because it is a largely unorganized platform of users. As shown by the Facebook search undertaken in this study, existing organized communities with large numbers of users can be assessed with very little effort or time. Public Facebook groups contain openly available member lists (grouped data) and can be based upon member's having a particular subject interest in a specific geographic location. E.g. Backcountry skiing in Alaska.

It is suggested that API tools based algorithms such as FLUID could be further developed or modified to take advantage of other social media platforms such as Facebook that include in-built community organization. Further research is needed to find or adapt API tools (such as FLUID) that can be applied to these community groups, specifically in how the member list data would be processed. It is expected that an API tool would be able to be developed with either the basic goal of obtaining user lists for profile data filtering for lead user identification. An adapted Facebook application may look for lead user characteristics, or user post that directly contain innovative product solutions or discussions. Possible limitations include requiring group administrators approval to access the member interaction content (posts), which unlike the member lists is not publicly availed to outsiders of the group. For SME's, these tools may be of major benefit by providing more direction or formalization of the lead user identification process. While large multinational companies have the ability to allocate large amounts of resources to social media market research and lead user searches and recruiting, SMEs and startups do not. As shown in this research, Facebook user communities are easily accessed and finding large user lists with interests in a specific subject matter and location requires little time, cost or effort.

5. Conclusions

In conclusion, FLUID has been shown as a user identification tool that can successfully filter lead users, specific to the social media platform twitter. However, while FLUID was employed successfully, Twitter has the disadvantage of being a large unorganized platform with huge amounts

of unorganized data. There is potential to use the FLUID method on other more organized social media platforms, which already contain grouped users (data) such as Facebook. It was shown through a simple search that Facebook has easily accessible field specific communities, with large user lists that are publicly available. It is well established, that lead users are regularly found in community groups*. These organized communities could allow SME's to search in a more lead-user rich data set, potentially yielding a higher number or higher quality of lead users at low cost. Further research would involve adapting a FLUID method that involves adapting the key processes of Keyword formulation, Data collection, Data Pre-processing, Classification and Validation, but using Facebook as the input data instead of Twitter. A case study could be undertaken in a specific field, with lead-user identification rates compared between Twitter and Facebook to validate whether utilizing Facebooks pre-existing community groups would result in higher levels of lead-identification. This would be of great benefit to SMEs and startups as it is expected that such tools to identify lead users from social communities would require minimal time, cost or other resources.

Conflicts of Interest: The authors declare no conflict of interest.

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