

COMPANY-USER COLLABORATION FOR DISCONTINUOUS IDEA IMPULSES: THE COGNITIVE DISTANCE OF USERS

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ABSTRACT

In order to create and address new markets companies constantly need to tap new sources of knowledge, especially from existing and novel users. Studies have shown that idea impulses which emerge from technical less experienced users turned out to be more original. Within this paper we want to improve our understanding of distant users at the borders of markets and non-users. We want to add a market dimension and knowledge dimension to the differentiation of users, to reach further detached market niches. Instead of solely classify individuals into a dichotomy of being a customer (bought a unit of the product or service) or a non-customer (did not buy a unit), we will apply the theory of cognitive distance on the company-user network. Derived from an interdisciplinary literature scan, we propose an operationalisation for the cognitive distance construct in user networks and draw the outline of a research proposal on the micro processes in collaboration in exploration.

INTRODUCTION

In order to create and address new markets companies constantly need to tap new sources of knowledge, especially from existing and novel users. Hence, companies are trying to engage users early in the process of product development in order to collect ideas, feedback, and other suggestions. Thereby it is crucial to understand what to expect from different types of users. While current users might give ideas that relate to the current design, novel and non-users might lead a company into new but also more uncertain territory (Chandy & Tellis 1998; Dan-

neels 2004; Christensen 2006).

In recent years, there has been a variety of research approaches to study the integration of users who are characterised as being more or less remote to the particular market (Chandy & Tellis 1998; Govindarajan & Kopalle 2004, 2006a, 2006b; Kristensson et al. 2004; Kristensson & Magnusson 2010). However, research on the micro processes of such collaboration in the context of user collaboration is scarce, especially when it comes to a collaborative group setting. Even in creativity research collaborative groups have gained attention only recently, when

it became apparent that creative activities involve increasingly social and collaborative processes (Montuori & Purser 1999; Sonnenburg 2004). To the best of our knowledge, up until now the potential and future user is a rather vague concept in the literature on innovation, so is the understanding of how a potential and future user's contributions in the idea finding phase differ from the ones of the current market. A micro process perspective will help our understanding of the processes that run down in the black box of idea generation that might be moderated by increased distance of the participating user. Company exploration is an ill-defined problem solving process and the innovation literature can learn from research approaches that rather relate to social science and cognitive psychology. Guidelines for practitioners how to adapt their tools of user collaboration might be derived from this interdisciplinary approach. Within this paper, we will apply the notion of cognitive distance on company-user networks. We propose an operationalisation for the cognitive distance construct which in a latter study will be applied to select users for collaboration. Thereby we focus on validated constructs that influence user behaviour, such as use-experience, and might exert influences on idea generation tasks (Alba & Hutchinson 1987). Starting with a definition of the term cognitive distance, we will relate it to

user collaboration. As a next step we will compare the early idea finding process to a problem solving process (e.g. Leonard-Barton 1995). The determining components of problem solving tasks give clues regarding what might be important in an operationalisation scheme. We conclude with the outline of a research proposition. It is on an explorative study which goal it is to shed light on the contributions one might gain in collaborating with distant users. Cognitive distance thereby is the moderating variable influencing a dyadic collaborative task. Research questions include: How do the individuals adapt their strategies towards solution finding, do collaborative strategies emerge and how is the process moderated by the degree of cognitive distance? We touch three crucial concepts that we think will guide the process of our analysis: (1) the cognition of an individual, (2) the needs of an individual and (3) creativity, which to a moderate extent is seen as a basic requirement.

LITERATURE OVERVIEW

User integration in innovation activities has been a well-regarded field of study in recent years (von Hippel 1986; Foxall 1989; Kristensson et al. 2004; Lettl et al. 2006). The underlying logic is that innovations inspired by users rest upon inherent and upcoming needs and thereby have a higher suc-

cess probability (von Hippel 1986). The lead user concept goes even further. Lead users are not only a source of knowledge but play a more active part in the actual conception and design of innovations (Lüthje 2004). Studies on collaboration with more remote users are scarce and have a slightly different focus (Chandy & Tellis 1998; Govindarajan & Kopalle 2004; Bonner & Walker 2004; Kristensson et al. 2004; Kristensson & Magnusson 2010). It is rather on sourcing knowledge in the form of e.g. idea stimuli than on more matured concepts towards implementation. However, the idea is the essential building block for a successful innovation (Henard & Szymanski 2001). Kristensson et al. (2004) showed that ideas generated by ordinary users scored higher on a novelty and creativity dimension than the once generated by professional developers or advanced users. They differentiated the user types by their academic education in programming skills. We classify their typology of the ordinary user as being more remote in a relative sense to the professional developers and advanced users. We compared the differentiation variable used in studies (non-conclusive) on the influence of more remote and less experienced users (see Table 1). Chandy and Tellis (1998) state that the orientation to future markets in their case can either refer to the involve-

ment of a different group of people than their current users, but also explore future needs of their current users. The latter three listed studies differentiate between users by technical knowledge or frequency of collaboration. The ordinary user in Kristensson's (2004) study lacks procedural knowledge how to get to a problem solution. The developers and advanced users have a clearer understanding of strategies towards solution and might rather engage in reproductive than productive thinking (Ekvall 1997). However, all users for instance are still taking part in the respective market. If you increase distance even further or on another dimension, you get to the borders and into niches of markets or even to actual non-users of a product class. In these areas, the differentiation is not anymore to be made on the depth of procedural and technical understanding towards solution finding and products, but much more towards needs people are trying to address (Christensen 2006; Paap & Katz 2004). This paper aims at improving our understanding of these distant users. A user is considered distant when she or he has had little contact with the dominant design, values different attributes of a product or service than the mainstream market or uses it in unorthodox ways, as we will depict later. The actual non-usage might be motivated by different factors, such as lack of a need

Study	Relation	Dependent variable or construct	Differentiating factor between users	Result
Chandy and Tellis 1998	B2C	Willingness to cannibalize and radical innovation	SBU level questionnaire regarding orientation towards future users and needs	Orientation positively influences willingness to cannibalize and thereby radical innovation
Govindarajan and Kopalle 2004	B2C	Disruptive innovation	SBU level questionnaire regarding orientation towards emergent users in addition with a definition and needs	Orientation positively influences the releases of disruptive innovation
Bonner & Walker 2004	B2B	New product advantage	Relational embeddedness (frequency of collaboration) and knowledge heterogeneity	New product advantage tended to be higher in projects that involved users with heterogeneous knowledge
Kristensson et al. 2004	B2C	Originality, value and realization of an idea	Academic education towards programming skills	Higher scores on originality and value of subjects with less programming skills
Kristensson and Magnusson 2010	B2C	Radical nature of ideas	Users' awareness of technological restrictions	Users who are unaware of any technological restrictions tend to produce more radical service ideas

Table 1: Empirical orientation or collaboration studies with more remote users

or interest, lack of certain attribute characteristics or barriers that keep an individual from using a product or service. Distant users might be differentiated along these factors. We want to add a market dimension and a knowledge dimension that does not focus on technical understanding only and lead us towards borders and niches of markets. Our approach is based on research on cognitive distance in collaboration (Nootboom et al. 2007), since explorative activities are increasingly collaborative processes (Montuori & Purser 1999).

COGNITIVE DISTANCE

In a stream of publications about the cognitive theory of the firm, Nootboom (1992, 1999, 2000, 2009) established the notion of cognitive distance between two co-developing companies. Cognition constitutes knowledge and perception, but also incorporates the processes that lead to knowledge and perception (Neisser 1967). The constructivist view of knowledge states, that action forms cognitive structure, while acquired cognitive structure provides basis for further action (Hendriks-Jansen 1996). As a result, people construct different representations of the world (Berger & Luckmann 1966). Cognitive distance is a term to describe and an attempt to determine the difference in cognitive structure between individuals. In interaction, difference in cognitive structure facilitates the chance to learn from the experience of the other.

Therefore, cognitive distance is imperative to learn and acquire new knowledge, though it also brings about misfits in understanding when distance increases (Nootboom 2007). Each individual needs to understand the language and context of the other. The ability to follow the other side's reasoning is regarded as a core ability in knowledge sourcing (Tushman & Scanlan 1981). These two opposing forces lead to the assumption that up to a certain threshold, increasing cognitive distance is beneficial to the outcome of interaction, while beyond that, it becomes detrimental. It suggests that there is an optimal balance between new information and problems of understanding. Innovation impulses often emerge in the interplay

between new and old needs and new and old technologies in niche markets (Paap & Katz 2004). Context shifts might originate at the more distant borders of markets.

From a company's point of view, a user is assumed at close distance (Nootboom 2000). However, looking beyond the realm of the current customer base, there are potential users who might only have had little contact with the domain, who did not yet use the product or service or who do not use it in the designated way. These potential and rather distant users might use relevant knowledge in their specific environment in a novel fashion and might be able to relate their contextual experiences to the domain of the organization.

EXPLORATION AS A PROBLEM SOLVING PROCESS

We take a closer look at problem solving as its constitutional parts might outline the effect cognitive distance has in solution finding. Exploration in organizations incorporates company-initiated semi-structured search processes that are aiming at innovation impulses. The process can be compared to a problem solving process (Leonard-Barton 1995). Human problem solving is constituted by the objective conditions of the problem, its subjective representation by the problem solver and the process, with which these representations are manipulated (Klauer 1993). As the outcome of an explorative search is unknown, the problem state is ill-defined. Unlike with well-defined problems, the application of standardised set of procedures towards a solution (strategies) is challenging or not feasible (Davidson 1994; Sternberg 1985). However, creativity techniques in idea generation are popular tools and thereby strategies with the goal to create something new. In order to come up with solutions to ill-defined problems a redefinition of the problem is necessary (Lubart & Sternberg 1995; Csikszentmihalyi & Sawyer 1995; Mumford et al. 1997). This redefinition is rendered possible by transferring and linking knowledge components of irrelevant or distant domains (Sternberg & Lubart 1991).

The elements of the problem solving process suggest that any problem has a frame of reference. Oversimplified, the

problem formulation and its objective conditions relate to a certain domain, the problem solver associates existing mental models and memory with this domain, and processes are often random sequences of search, articulation, evaluation and redefinition. When the problem state of the task is the ambition to create something new, the discovery will always relate to something old or something we know. Novelty does not emerge within a vacuum, but builds on preconditions, such as experience, knowledge, beliefs and emotions (Koestler 1966). Even if idea generation processes are led under the dogma to discard any known limitations, in practice it is hard to dust off from first associations and commonly related constructs (Leonard-Barton 1995). Increased cognitive distance in a group might bring this desired flexibility into the collaboration (Rubenson & Runco 1995). Cognitive distance between users than would serve as a moderating variable.

DIMENSIONS OF COGNITIVE DISTANCE

Before we elaborate in more detail upon the effect cognitive distance might have in company-user interaction, it is important to identify dimension to approximate cognitive distance between users and a domain. In a collaborative dyad, we have three important points of reference. Each individual constitutes one and the third one is the domain to which the explorative activity is laid out. The domain can be a product-class offered by a company or a business unit. If the distance between a user and a particular domain can be approached, we also can draw inferences on the distance between the users in relation to the domain. Cognitive structures and states of individuals are hard to map, since there is no direct measurement instrument (Klauer 1992). It seems quiet intuitive that there are many dimensions that might constitute a person's cognitive distance towards a domain. We concentrate on two dimensions; a knowledge and a market dimension. The selection is driven by the definition of cognition and our aim to look at distant markets. *Knowledge dimension.* Cognition concerns that which is known by an individual (Scott et al. 1979; Neisser 1967).

In the constructivist tradition, knowledge is subjective. It constitutes ideas a person holds about the self, the world or objects (Scott et al. 1979). Validated constructs in literature that relate to knowledge of users are e.g. use-experience and user knowledge. They are certainly not independent of each other, but still relate to different expertise (Alba & Hutchinson 1987; Park et al. 1994). Use-experience constitutes knowledge through direct interaction between the user and a product and is directed to fulfil a goal. Cognitive structure originates from this interactive process. It provides the basis for further involvement with the domain, no matter whether it is in a purchase decision or in a creative process (Alba & Hutchinson 1987). In contrast, user knowledge presents the body of knowledge on a broader scope. It encompasses sources other than usage (Brucks 1985) and might be classified as being more theoretical expertise.

Market dimension. As the challenge is to look at close and distant markets, a market dimension is crucial. Market segmentations of companies mostly build on demographic variables, such as age and income. These segmentations do, however, not reflect the problems people try to solve by using a product and thereby are not very useful in attempting to uncover upcoming markets (Christensen et al. 2007). Furthermore, the ownership of an object from a product class is in our opinion insufficient to represent the affiliation to a market, partly because it is seen more related to the construct use-experience (Alba & Hutchinson 1987; Park et al. 1994). A need towards the particular domain seems more appropriate, since it allows for more finely grained distinctions. Remote but potential upcoming needs might indicate relevant market

development areas. Ideas that have disruptive potential, for instance, nurture often in remote and niche market segments (Christenson 1997; Henderson 2006). Their needs are often directed towards different performance parameters of product classes than the ones the current market values (Danneels 2004). Segmentation by needs seems to be more appropriate then, since preference shifts from the current market towards the niche seem to appear in extensive market changes (Henderson 2006). Having a need is an important condition to assure involvement and certainly affects motivational factors of an individual (Amabile 1996).

MAPPING THE DIMENSIONS

Neisser's (1967) definition of cognition encompasses the perception of an individual. In certain psychology scholars individual needs are seen to influence an individual's perception by affecting the availability of interpretive categories (Scott et al. 1979). We assume these two dimensions to influence each other in some way. Obviously, a strong need that might be met with a certain object might drive a person to get involved with that object, which might lead to experience. Experience with an object also might create needs or awaken latent ones.

We now map the dimensions and define both by a distance measure increasing from its point of origin and get the following segmentation (see Figure 1).

We argue that there are three rough segments that can be established along the dimensions: the close user, the distant user and the most distant user. The dashed line emblemizes a well-balanced relation between these two dimensions, which is not closer defined, since we do not know the relation between need and experience in greater depth. However, the proportion of the two distances to each other might be useful to refine each segment further. The segment of most distant users is a necessity to account for the vast part of the population that just does not want to take part in a market. Oftentimes, non-users are just that (Anthony et al. 2008). In the following we will look at the different segments in more detail. The close user segment might entail what is often referred to as the current users (Chandy & Tellis 1998; Chris-

tensen 2006; Danneels 2004; Henderson 2006). They have a strong need that is fulfilled with the particular product class and match the need the company is trying to address. Experience is gained by constant usage and constructs domain relevant knowledge about performance attributes, (physical) components and how (physical) components and attributes affect performance attributes (Mitchell & Dacin 1996). Furthermore, close users value certain proportions between attributes of a product and can distinguish between objects by indicating whether an object has more or less of an attribute (Mitchell & Dacin 1996; Alba & Hutchinson 1987). One notion that we want to emphasize here and which relates to the reasoning above is that the focus on the most valued performance attributes of dominant designs might obstruct the perspectives for discontinuous changes (Christensen 1997). The emergence of new dimensions or the emphasis of a rather unvalued product dimension might be more important to discover new markets (Christensen 1997, 2006; Govindarajan & Kopalle 2006; Henderson 2006). That points to the importance of exploring the surrounding segment.

The users belonging to the segment labelled distant user are on one or both distance dimensions significantly further out than the segment labelled close user. Around the dashed-line you might think of individuals who are rather occasional users with rather low verve. But how can we interpret the extremes when we move either far left/up or far right/down from that line, as depicted in hatched quadrates (see Figure 2).

In the upper left quadrate the need distance is proportionally lower to the experience distance. At that point the distant user has a distinct need with regards to the product class under consideration, but is lacking pristine experience. One explanation for the imbalance between the dimensions might be a constraint the user is facing, represented by one or more usage barrier(s). Since we are seeking ways to depart from dominant designs, the barriers these users might face are not fully congruent to the once discussed in the literature dealing with the resistance to innovations (Ram & Seth 1989;

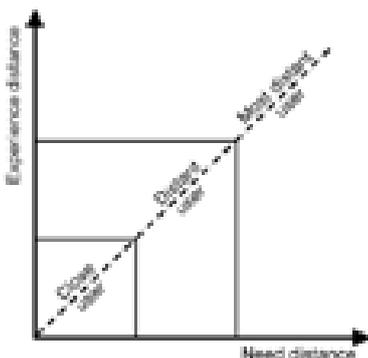


Figure 1

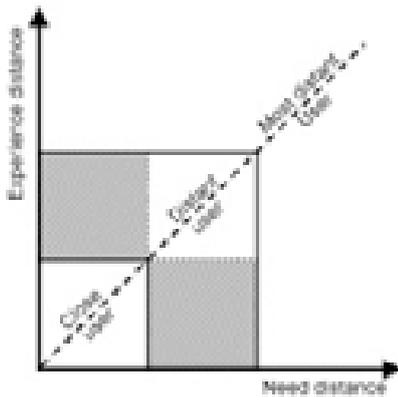


Figure 2: Two extremes in distant user segment

Garcia et al. 2007). Dominant designs might have reached the level of being a commodity altogether and might so much the more be on the verge to a discontinuous change. Potential risk or tradition barriers for instance might have been torn down a while ago. At that point, barriers that relate to the endowment of the user or the dominant characteristics of the particular product class might be more likely the cause for the lacking experience. Four often referenced once are lack of skills, lack of means (often financially), lack of time or lack of access (Govindarajan & Kopalle 2006; Christensen 2006). In particular cases, the latter is strongly related to the context of common usage. Some people might not use a certain product since it is not available in contexts where they would like to use it or would use it more often as it becomes accessible in these contexts. An example would be a strong need to pass one's time while waiting on a bus, before smart phones enabled people to pass their time on the go as they would do at home (e.g. mobile television). These barriers might be more rigid as they cannot easily be removed with marketing effort. They might demand a strong alteration of the product offering, in some cases even in the underlying business model (Christensen 2006). Collaborating with these users early on might shed light on new and unexplored usage contexts for an existing technology or different ways to approach the need, since these users might have alternative ways to meet their need in the end.

In the lower right quadrante the experience distance is proportionally lower

to the need distance. At that point the distant user has pristine experience with regards to the product class under consideration, but is lacking a distinct need. One explanation for this imbalance might be unorthodox usage. It is assumed that products have one central function, but not always do users use the product for the purpose or in the way it was intended to by the company (Bercun 2007). Often product attributes and functions are used to meet a slightly different need or in extreme cases are applied in another domain. Well-known ideas emerged when product functions were applied to other domains: A vine press was used for book printing, white paint was transformed as a means of painting out typing errors when mechanically typewriting (Hentschel 2009). Unorthodox usage is triggered by the absence of an appropriate product or by inflicted barriers such as monetary endowment or restrained access. Companies have a limited view on how their products end up being used (Hentschel 2009), but changes of the product/object itself or the application context might loosen what is often referred to as functional fixedness and inflexibility (Allen & Marquis 1964). Unorthodox usage might point to development paths that deviate from the dominant product dimension and depict the importance of unvalued ones. It intensifies the dilemma between preserving the common domain and exploring new ideas that might enlarge or even change the field of activity (Kanter 2007). We define a user who is addressing a different need with a product than intended by the company as more distant.

In both quadrates you might find barriers. The ones in the upper left quadrante in tab 2 prevent people from using a company's product. The ones in the lower right quadrante exist in other domains and might force people to use a company's product in an unorthodox way.

OUTLINE OF RESEARCH PROPOSITION

We want to test the effects cognitive distance might exert in collaborative idea generation tasks within an explorative quasi-experimental design. It is not entirely explorative driven, since we already derived certain assump-

tions from other fields such as psychology or creativity research. These will be tested to an ill-defined problem solving task: explorative search for new market opportunities.

Subjects are recruited by a screener questionnaire which contains items that represent the prior proposed constructs use-experience, user knowledge, need and potential barriers. These constructs are domain-dependent. Domain-independent constructs such as empathy and innovativeness will be applied for two reasons. They serve as control variables and should be present to a modest degree to assure activity in the tasks. Social influencing factors of groups are minimized by a dyadic group setting (Rubenson & Runco 1995).

A subject can either be classified cognitive close or distant to the particular domain. This leaves us with three possible constellations: (1) both subjects are cognitive close, (2) both subjects are cognitive distant and (3) one is cognitive close, the other distant. Prior to the idea generation tasks, each subject is asked to state her/his first association to the domain. The overlap of dominant associations between subjects serves to confirm or disconfirm the presents of cognitive distance (Stroebe and Diehl 1994). Apart from the rules that are known from brainstorming tasks, the idea generation tasks are unstructured. At the end of the task each subject is asked to quickly draw their favourite idea impulse. A quick drawing of an idea - though highly subjective - might transport much more information than a subject might be able to express. Afterwards, each subject goes to a short questionnaire, asking how she/he came to grips with her/his ideas in the session, how satisfied he/she is with the outcome and how she/he was feeling influenced by the other person and in what way. The idea generation tasks are recorded, transcribed and analyzed. The method used to analyze the transcriptions is the verbal analysis (Chi 1997). The coding scheme is derived from research outlined above and literature on collaborative processes. Codes will relate to processes, knowledge, outcome and social factors. The outcome of the generation tasks will be evaluated by an expert panel with regards

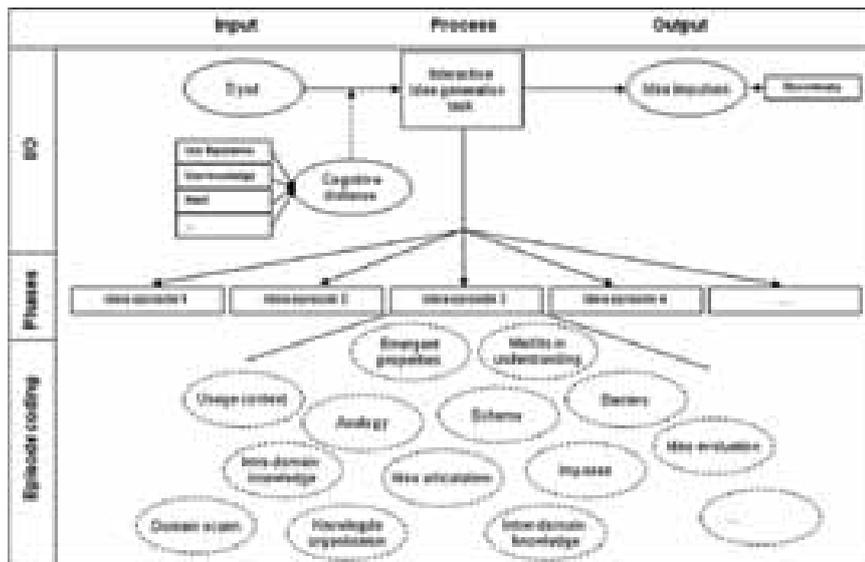


Figure 3: Input-Process-Output Model

to novelty, discontinuity and creative realism. We will analyze whether ideas are rather synthesized through an act of individual imagination or through cross-fertilisation and what precedes the articulation of those ideas. We look at how the subjects adapt their individual strategies towards solution finding, which we believe to be moderated by their degree of cognitive distance. We will provide first inferences towards the question if an optimal cognitive distance exists in collaboration with users.

There are multiple ways that coded data can be depicted, depending on the formalism chosen. As in our choice of taxonomy of codes, a simple table presenting the means for each code might be adequate. It lists how often each code is used by a user, split up to the distance classification. The differences between these classifications need validation on the domain-dependent constructs. For the strategy usage, a transition table is valuable, that shows in how many cases a certain process component was followed or preceded by the others. Once the coded data are depicted, then one can begin to seek patterns in the results. Is there a correlation between the distance and e.g. a frequent use of intra-domain knowledge, what kind of code preceded actually the articulation of an idea etc., is it rather done individually or by interactive synthesising, do experienced users more often identify a “good” idea due to their prior knowledge etc.. We will analyze whether a group of sub-

jects (e.g. the “close-distant”-group) generated proportionately more discontinuous ideas than another group of subjects (e.g. close-close-group) or if in general misfits in understanding occurs more often in the close-distant group and if that leads to creative tension or blocking of the process.

The design is depicted in an input-process-output model following West (2003) (see Figure 3).

DISCUSSION AND CONCLUSION

New usage context and upcoming needs might upset the existing order of established practice. To hit upon these impulses, it might be fruitful for a company to explore the boarders of markets and actual non-users (Chandy & Tellis 1998; Danneels 2003; Christensen 1997). There has been research on the orientation of business units towards remote markets. A few impressive qualitative studies have explored the value of integrating relatively inexperienced users. We add a market and knowledge dimension that is directed towards users who are even less attached to a market, users who do not belong to the market or find themselves in unaddressed niches. Preference shifts towards niche market needs are in some cases causes for disruptive change (Henderson 2006). Our contribution is derived from a literature scan in various research areas and needs testing. We proposed an input-process-output model for idea generation tasks, which we will apply to pursue the question how contributions

of users differ as cognitive distance increases. Though it is designed as an explorative search, we also anticipate to get a clearer picture of patterns that emerge in interactive ideation tasks led by assumptions. However, it is not before the empirical testing, that we can depict managerial implications, but we are confident to give recommendations on how to structure explorative search processes when discontinuity is the desired outcome in the near future.

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