

A Critical Look at Knowledge Creation

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Abstract

Knowledge creation and creativity are important topics and have therefore received much attention in both the CSCW and other research communities. By introducing and examining the use of a creativity-enhancing prototype we encountered unnoticed, and thus unsolved, problems regarding intellectual property rights and feasible reward mechanisms. We argue in favour of a more critical look at knowledge creation, where one does not allow oneself to be carried away by the current hype but thoroughly examine all aspects of the phenomenon. Intellectual property is an aspect deeply connected with the knowledge creation process that thus far has been largely ignored. We point to some practical consequence of this and discuss possible workarounds.

Keywords: knowledge creation, creativity, intellectual property.

BRT Keywords: GA, BB

Introduction

With the advance of the knowledge intense firm the realisation of the importance of knowledge and organisational learning has grown. Knowledge has been called the only meaningful economic resource of the postcapitalist or knowledge society (Drucker, 1993), and Prusak (1997) says "[a] firm's competitive advantage depends more than anything on its knowledge". This trend has advanced from an awareness of the importance of these issues to become an almost irrefutable truth.

There is an inherent danger in the act of taking good ideas and raising them above the level of common sense so that they become universal truths, which cannot be easily criticised for fear of seeming ignorant, stubborn or simply conservative. The danger we refer to is the fact that the original concepts are undoubtedly valid but no idea should be beyond criticism or refute. Often management and organisational truths evolve and become ideas of this stature. These ideas briefly become untouchable truths, widely proclaimed as solutions to all problems until they fall out of favour with researchers and users alike who then begin the process of tearing down the idols and simultaneously searching for new universal truths.

This behaviour is as irrational as it is unprofitable. If we look at the concept of knowledge creation and the tools which are designed to enhance the process we can see that they follow the same model as we have described. They started as good ideas and have now become universal truths. If the previous behaviour is followed the next steps will be a process of maturity and then eventually a revolution where the ideas fall out of favour.

This paper is not an attempt to begin the process of deconstructing knowledge creation but rather an attempt to discuss the effects - good *and* bad - that the introduction of knowledge creation tools have. While most research reports only good examples and positive effects, we point to some previously unnoticed negative effects and argue that a more critical examination of the field may reveal other similar findings. These drawbacks should be exposed and addressed or otherwise useful tools for supporting knowledge creation may fail. The practical failure of these tools may not necessarily depend upon the design flaws of the programs but rather on the way we organise work.

Related theory

In order to understand the discussion we are about to engage in we believe some previous work should be brought forward to set the scope and provide the theoretical framework for our reasoning. Though knowledge creation springs out of individuals, these individuals must not be in solitude but engage in social interaction (Nonaka and Takeuchi, 1995). We will therefore first establish what has been said about social networks and how communities of practice emerge. We then refer to some recent work on knowledge creation and creativity and how those relate to social communities. Finally, we describe two legal aspects relevant to knowledge creation; patents and copyrights.

Social networks and communities

Humans are social beings and as such, we tend to organise ourselves in groups, clusters, villages, cities, networks, and other constructions that enable us to interact with each other. In working life Wenger (1998) points out that *communities of practice* (CoPs) emerge naturally around things that matter to people. These CoPs exist in any organisation, they are born from the social and physical interactions that occur, and membership is based on participation rather than on official status. CoPs are thus fundamentally self-organising systems.

The introduction of information technology (IT) enlarges the scope of CoPs, both temporal and spatial, which creates new and interesting possibilities. Brown (1998) warns that IT has a tendency to reinforce old, formal, hierarchical structures and suggests that care must be taken to utilise IT in such a way that it supports informal networking. With Intranet, Extranet and Internet and the applications acting up on these infrastructures, the social phenomenon of CoPs exists in cyberspace as well, called *virtual communities*. The virtual community becomes a place, or what Nonaka and Konno (1997) refer to as "cyber-*ba*", shared virtual spaces for emerging relationships between colleagues, in which one can meet, discuss, share knowledge, and learn as an individual, as a group, and as an organisation. This makes it possible to develop ideas with people whom one may not yet have met in person, but with whom one shares the same interest. In the real world there are tools that support spontaneous meetings and the creation of CoPs, like the meeting-tools coffee machine and photocopier. These types of meeting-tools exist in cyber space also. One example of this kind of a tool is the homepage of someone. With the homepage a person can get people interested in a subject, contact the author, and in this way start a virtual community.

Unlike the traditional face to face meetings, the virtual community utilises tools to actively support communication and information storing. These tools promote the development of swift and asynchronous meetings and interactions in between members of the virtual community. To be a member of a community is to be committed to the subject of the community, to be active on a voluntary basis, contributing information relevant to the community. If a member do not contribute information or if they rather discuss a different topic, they are not *de facto* part of the community. They might then start up a new virtual community, focused on their particular interest, and start to create new knowledge.

Knowledge Creation and Creativity

Knowledge creation in organisations is a topic discussed by several (e.g. Nonaka and Takeuchi, 1994; Davenport and Prusak, 1997; Nonaka and Konno, 1998; Brown, 1998; Brown and Duguid, 1998) over the last five or so years. Though it is outside the scope of this paper to fully cover or try give an exhaustive explanation of each and every one of these theories, we will briefly highlight some, we believe, central arguments of these authors.

Nonaka and Takeuchi (1994) suggest the use of Polanyi's distinction between *explicit* and *tacit* knowledge. While explicit knowledge is codified knowledge, easy to articulate and share, tacit knowledge only exists within people and expresses itself through their actions. When people get together and socialise tacit knowledge is transferred from individual to individual. This knowledge is then externalised to become explicit through the process of concept creation triggered by collective reflection. Through communication and diffusion, newly transferred and old existing knowledge are combined to form systems of knowledge. By identifying what knowledge is relevant to oneself, each individual must internalise or embody the new explicit knowledge to tacit knowledge. The "knowledge spiral", to use Nonaka and Takeuchi's phrase, has come to a full circle. Nonaka and Takeuchi argue that knowledge is created out of this dialogue between tacit and explicit knowledge and that mixing people with different experience is a necessary condition for knowledge creation. Knowledge, however, must then be used at a specific time and at a specific place to be of value and Nonaka and Konno (1998) argue in favour of using IT to create such spaces of shared time and place.

Davenport and Prusak (1997), who emphasise that knowledge is "as much an act or process as an artefact or thing" (p. 53), speak of five modes of knowledge creation; acquisition, dedicated resources, fusion, adoption, and knowledge networks. Acquisition includes "stolen" or "borrowed" knowledge found either within or outside the organisation. It is not restricted to new knowledge in the absolute sense but only new in the current context. Dedicated resources refer to different ways of institutionalising creativity, e.g. in separate Research & Development departments to shield it from distraction. Fusion, on the other hand, involves adding complexity or even conflicts to force people to create joint solutions and synergy effects. Adoption deals with how self-organising communities react to crisis when faced with an "adapt or die" situation. It is argued that success often is the enemy of innovation. Knowledge networks, finally, are defined as communities of people who share a common interest and utilise groupware, email or telephone to share expertise and collectively solve problems.

Brown and Duguid (1998) also argue that a great deal of knowledge is not the property of individuals but rather held collectively by people working together. They talk of *know-how* as being knowledge created out of practice and since most work is a co-operative venture most knowledge is collectively shared by work groups. Collective practice leads to shared sensemaking, distributed understanding and, finally, collective knowledge. Brown and Duguid claim that *de facto* communities of practice will develop

from these groups without the members thinking of themselves as a community. The community will influence and change practice, which in turn may reshape the community. In these communities of practice new knowledge is constantly created and shared. Moving knowledge between communities, however, remains difficult since the social context plays such an important role. IT should therefore allow and support informal communication and participative learning rather than reinforce formal organisational structures and the limitations of classrooms (Brown, 1998).

As seen above, all authors see group interaction, where people from different backgrounds but with similar interests meet informally, as vital to knowledge creation. They all argue that places of shared time and space must be provided, and that information technology may be used to facilitate this electronically.

One special case of knowledge creation is *creativity*. Though somewhat different, creativity has a strong relationship with knowledge creation that deserves to be discussed in this context. Many from the organisational learning community have studied how ideas are generated and diffused in organisations, and one of the more prominent contributors is James March. According to him one important success factor for creativity is the absence of early critique. March suggests that new ideas, in general, must be given sufficient time to mature and to be explored, since "*good ideas look identical to bad ideas until they are tried*" (March, 1998). New ideas should therefore be shielded from criticism during their early stages, since we cannot reliably separate geniality from madness until we can look at it in retrospect. "*[T]he difference between visionary genius and delusional madness is much clearer in history books than in experience*", as March (1999, p. 226) puts it. In real life, ideas that pop up are often killed by ourselves, as we, at second thought, manage to discard them as being "not yet ready".

March notes that knowledge both contributes to, and is a hindrance to, the generating of new ideas and he suggests us to sometimes treat memory as an enemy (March, 1994). The conventional way of doing things, based on old wisdom, may not be the best, especially so in times of rapid change. An "authority", e.g. a professor, a senior executive, or an otherwise esteemed member of the organisation, can thus unintentionally kill an idea simply by contributing to the debate. However, if there is no telling who the proposer is, the suggestions are judged from their content only without unnecessary prejudice or bias, and this gives new ideas a better chance of surviving.

Legal issues

Legislators around the world have long discussed the need for protecting the fruits of intellectual work. The most common method has always been to reward a person by granting a monopoly. This monopoly may have been on a process or a product and is the basis of the world's intellectual property system. The general motivation today for granting an inventor or an author a monopoly on his idea or text is that this promotes the spread of ideas by rewarding the inventor. While the inventor is free to exploit his monopoly during the early years and reap his rewards, society is rewarded by the fact that the knowledge the inventor creates is dispersed into society. This knowledge can be used in additional research, which will hopefully result in new patentable ideas or processes. After the monopoly period is over society reaps its second reward since then the idea is free to be used by anyone. The thought behind this is that the inventor has by then had the time to create a substantial machinery for sales and marketing that he will be able to maintain his competitive edge.

Before we continue we must first see which types of ideas may be protected. The law has chosen to divide intellectual property into several groups but this paper is only concerned with two different categories of legally recognised protectable ideas.

The first such category is the patent. This is probably the earliest form of intellectual property and can be traced back to the fifteenth century (Lloyd, 1997). The history of the patent has had a chequered past and at times it has been used shamelessly as a method of rewarding any person for doing service to the King and had nothing to do with intellectual effort on the part of the monopoly holder.

The modern patent is governed by similar laws in most industrial countries and there have been several attempts to implement international conventions but none have been particularly successful. There are common factors among patents and these are the criteria for obtaining a patent in most legal jurisdictions.

1. The object of the patent must concern a new invention or process
2. This must involve an inventive step
3. The result must be capable of industrial exploitation

The first point is not very controversial, but what this point implicitly explains is that only an object or a process may be patented. This effectively concludes unexpressed ideas, texts, music etc. The second point is probably more controversial since it is an attempt to try to define what an invention is. The inventive step is the leap of reasoning the inventor has made and it is for this creative leap which he must be rewarded. An example of this could be the combination of computer, cell phone, key finder and camera in one small portable unit. This gadget could be called an invention and is unquestionably as useful as any Swiss army knife but is not an inventive step since it is not difficult to foresee the combination of these artefacts into one portable device.

The last requirement for a patent is that the invention or process be capable of industrial exploitation. This requirement can usually be widely interpreted since the definition of industrial development does not mean that the invention has to be used within industry.

The second category is Copyright. This is an area where legislators have managed to a much further scale in their efforts to introduce international conventions, which make copyright legislation much more uniform and enforceable around the globe. There have been a number of unilateral and multilateral agreements but the most important one is the Berne Convention, which was first signed in 1886 and has been revised many times since. The fundamental thoughts behind the Berne convention are still the basis of copyright law today. Under the Berne convention and most national legislation copyright protection is used to protect literary and artistic works which is described as:

The expression "literary and artistic works" shall include every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as books, pamphlets and other writings; lectures, addresses, sermons and other works of the same nature; dramatic or dramatico-musical works; choreographic works and entertainments in dumb show; musical compositions with or without words; cinematographic works to which are assimilated works expressed by a process analogous to cinematography; works of drawing, painting, architecture, sculpture, engraving and lithography; photographic works to which are assimilated works expressed by a process analogous to photography; works of applied art; illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science. (Berne Convention, Article 2 (1))

From this list we can see that copyright is a very flexible instrument which may be used to protect artistic expression in almost any form. The term artistic reflects the origins of copyright; it was designed to protect literary writers since they were considered

a valuable asset to the national heritage. This has since been expanded upon and copyright now is independent of its artistic background since. One of the main motives for this rule is that the courts would rather leave the discussions on the definition of art to the philosophers.

The advantage of copyright is that the protection enters into force directly at the moment the idea is recorded in a tangible form. Therefore a piece of music is protected as soon as it is written down or recorded whichever comes first. The effect of copyright protection is that the artistic expression may not be reproduced in any form without the express permission of the author.

Empirical studies

To gain better understanding and experience real consequences of the above theories we studied the introduction of a creativity-supporting application, *Brainstorm*, on a corporate intranet. Since *Brainstorm* was design in order to study and promote creativity, idea generation, and knowledge sharing in an intra-organisational setting, issues such as "communities" and "trust" were not addressed explicitly. We therefore think it is interesting to see what the consequences of introducing such a tool might be.

Description of a Case: IT support for Brainstorming

Brainstorm, which initial purpose and intended functions are described in more depth elsewhere (Stenmark, 1999), is a prototype of an application that would mimic the creative atmosphere often found in brainstorm sessions, where no suggestions are turned down but used to spawn new and possibly even better ideas. Unlike an ordinary physical brainstorm meeting, *Brainstorm* supports asynchronous "brainstorming", allowing ideas to develop long after the point of introduction. The system further allows the proposer to be anonymous yet providing a mechanism for letting people contact them.

A schematic description of the application looks like this:

1. The proposal or idea is, often only very briefly, sketched in an email and submitted to a dedicated SMTP mailbox.
2. The *Brainstorm* engine pulls the mailbox every sixth minute, downloading any new email.
3. *Brainstorm* dynamically updates a web page with the content of the downloaded email. The return address of the sender is kept in a separate file and not displayed on the web page.
4. The updated web page is visible to other users via any standard web browser.
5. Should a user be interested in any particular idea or suggestion, a hypertext link associated with each item will bring up a CGI-based form allowing the user to enter a comment, leaving a phone number or email address, or whatever.
6. The entered message is then returned to the *Brainstorm* engine, which resolves the email address associated with the suggestion.
7. The message is then forwarded to the original proposer, who remains unknown to all but the *Brainstorm* engine.
8. The proposer may now decide to give up his or her anonymity and contact the interested user for a direct discussion.

Since March (1998) argues that most new ideas are actually *bad* ideas, at least in the short perspective, we designed *Brainstorm* to allow the generating of *a lot* of suggestions, which is exactly what happens in a physical brainstorm session. Each idea in itself might not be so bright but the cumulative effect of the generated creativity is what

makes the difference. For this snowball effect to take place, however, the ideas must not be hidden away. On the contrary, they must be exposed to as many people as possible and here is where computer supported shared spaces or virtual communities come in. This is consistent with the suggestions of both Brown (1998) and Nonaka and Konno (1998).

All suggestions are submitted as emails and added to a web page. The web is easily accessible from all platforms, and there are many tools available to help users find information, e.g. search engines, web monitors, and agent-based applications. Further, a web page adds asynchronicity to the sharing process. Users do not have to be active simultaneously which removes the temporal restriction present in e.g. chat forums. The persistent nature of the web page also allows the idea to linger long enough for it to be found by many different people in different locations and contexts. We therefore implemented *Brainstorm* so that only the system administrator can remove submitted proposals, and it can be argued that this persistent nature serves a purpose.

Brainstorm allows for anonymity for two important reasons; first, users may submit proposals without risking making fools of themselves, a fact that will have a positive effect on the amount of ideas. Second, it will help focus on the actual content of the proposal and not on the contributor.

The possibilities to add comments directly to the proposal, as is the case in news groups, as absent in *Brainstorm*. This helps shielding the new idea from *public* negative critique. Still, we believe that it should be possible to contact the proposer either to *ask for* or to *provide* more information. Though the latter may contain criticism, the original idea remains publicly available and can serve as a seed for others, while the critique is *not* displayed.

Some early user comments

We have tested an early beta version of *Brainstorm* in a Swedish organisation and though we have not done any evaluation, we have had introductory discussions with members of the organisation about the suggested design of *Brainstorm*. These sessions included both members of the Proposal-Handling Committees (PHCs), i.e. the people responsible for evaluating submitted ideas, and individual employees. One question raised was what will happen if an initial idea, proposed by A, inspires B to generate a better idea, which then is modified by C to the great IDEA that receives acknowledgement by the PHC and renders a gratification. Should not A and B have some credit? If not, they are instead encouraged to keep their ideas to themselves to try to develop them into what C managed to come up with.

The above question is, indeed, legitimate because without proper incentive, technology, even if ever so user-friendly, will not be used. However, the suggested behaviour would be very unfortunate from an organisational point of view since chances are that neither A, B, nor C would have managed to create the IDEA on their own. The IDEA might be the result of the *interaction* of A, B, and C - a social knowledge creation process that required the combined input from all three parties (Boland and Tenkasi, 1995).

Discussion

Brainstorm is an application prototype intended to provide a brainstorm-like atmosphere where creativity is encouraged and promoted. The prototype is implemented as a web-based application to take advantage of the possibilities of sharing time and space. By being persistent, allowing for anonymity, and preventing direct public feedback *Brainstorm* meets the criteria suggested by March. Ideas are made available for others to

benefit from, unnecessary bias is avoided, and initial critique is suppressed. However, brainstorming is only one activity in the creativity process, and for group creativity to work, other factors such as shared knowledge, commitment to common goals, and mutual trust must first be established (Bennet and Karat, 1994). It can be argued that this cannot be accomplished in an anonymous environment such as the one provided by the *Brainstorm* prototype. However, *Brainstorm* is intended for an intra-organisational web where a minimum level of common objectives and mutual trust can be assumed to already be in place. Further, the objective of *Brainstorm* is not to deliver a full environment for collaboration and co-operation, but to serve as a catalyst for creativity. The purpose is only to get ideas out in the open for the community to share and develop whatever can be developed.

Unfortunately, creativity is not something that can be ordered about. Instead, the organisation should encourage, and provide the necessary conditions for, creativity and knowledge creation. As noted in the theoretical section earlier, sharing (and even borrowing or stealing) knowledge is vital to the knowledge creating process, and it is suggested that informal communication channels should be established to support such sharing. However, there are other implications of such a strategy that are less favourable, but which nevertheless must not be ignored.

We have followed this line of thought a bit further than what is usual within the CSCW community and examined the possible consequences of implementing a creativity-facilitating device based on sharing and informal networking. This critical look has unfolded a new and seldom discussed problem area - legal issues. Intellectual property right issues play an important role in all knowledge work and since knowledge work is becoming a larger and larger portion of the total work, the issue must not be neglected. Amongst many other things, the reward mechanisms in place within the organisations do play an important role regardless of whether we mean financial compensation or "merely" recognition. The early comments on *Brainstorm* supports this claim.

If trying to protect ideas by using the patent approach, we can quickly deduct that an application such as *Brainstorm* will not work on the Internet, and probably not on an extranet either. This is because the information has been spread to a much too wide circle and the idea no longer is inventive but rather an expression of common knowledge. Without the inventive step, the idea will not be patentable, according to current praxis. If we look at the intranet usage of *Brainstorm*, we find that when promoting ideas within a company the issue of the inventive step will not be a problem, since the development has been in-house. When a request for patent is submitted, the legal entity handling the matter is only aware of the final outcome and there will be no conflict. However, there will be other kinds of problems, as discussed below.

When attempting to protect ideas developed through *Brainstorm* with copyright, we observe that Article 2 of the Berne Convention shows that the interpretation of what may be copyrighted is described widely. We therefore end up in a situation similar to the above. If the *Brainstorm* application is used over the Internet, or an extranet by employees belonging to the same organisation but in different departments (and maybe different legal entities), the fruits of their work will be divided amongst the different users. While this is not impossible and does not negate the copyright it does cause serious problems. The owner of a copyright is entitled to the royalties and may also grant permissions for others to use his work. This situation becomes exponentially more complex with each owner we add into the equation.

If the *Brainstorm* application is used by employees in the same company, there is a fundamental issue, which must be addressed. In most cases the products of employees work belongs to their employer. So if the employees all belong to the same organisation, the results of using the *Brainstorm* application will belong to the employer. The

preliminary studies of the application show that while this is not a primary concern, the use of *Brainstorm* is not uncontroversial. The problem moves from being a legal issue to being a question of reward and motivation for employees. If *Brainstorm* is implemented without a supporting employee reward system there is little incentive for employees to actively use the application. For a successful implementation, the environment into which the application is introduced must promote active use and individual rewards if the project is to succeed.

For example, if one user contributes with *A*, which may be a suggestion or even just a comment, it may be observed by another user and, eventually lead to *B*. Note that *A* and *B* need not have a visible connection. Even the user suggesting *B* may be unaware of the mental link from *A*. Likewise, *B* may eventually lead to *C*, which in turn inspires *D* and *E*. None of these suggestions or ideas need to be "good" or "useful". Eventually, however, the cumulative process leads to a point where *G* - a useful, constructive, practical suggestion - can be identified. This is illustrated in figure 1 below.

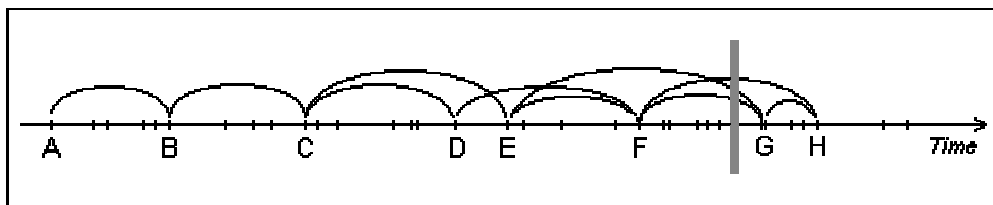


Figure 1: Suggestions (tick marks) and how they inspire (arcs) new suggestions. Suggestions *A* to *H* indicate a particular "thread" of ideas. Somewhere in time (the gray vertical bar) the thread becomes a "concrete idea".

Note that a "thread" in this context does not have to be explicitly identifiable. On the contrary, a user may have been inspired by an earlier remark without being aware of this fact. To further exemplify, suggestion *A* above may not be a real idea but merely a remark: "All email is driving me crazy. Can't we throw out our email system!" This is not a very creative suggestion but someone else reads it and the suggestion spawns a process in that person's unconscious mind that later results in *B*: "Must all this For-Your-Information email really be email? Aren't there any other channels?" What finally comes out as a practical suggestion (*G*: "Create a Lotus Notes database with all new job postings"), does not have any traceable connection to any of the preceding suggestions, and certainly not to *A*.

The local PHC could be the entity responsible for identifying when an idea has reached the required level and reward the users behind suggestion *G* and *H* in the above example. The PHC would also decide how to split compensation and recognition amongst several contributors. The comments from our early reviewers suggest that this presents a problem already in an intra-organisational setting, and the problems are not likely to become smaller if we try to extend the context to include external parties.

Reward mechanisms must also be able to handle the many bad ideas that are due to forego the few good suggestions. Without encouragement, the bad ideas are kept back resulting in less seed for good ideas. We need to promote *all* ideas, since they all contain something potentially good. Using March (1999) words: "*We don't want to reward mistakes, but we should reward the imagination that sometimes leads to them*". The users contributing with *A* to *F* respectively, could then be rewarded with some points of credit (CPs), say 1 CP per submitted item. These CPs could later be substituted for other tokens, e.g. 200 CP earns a free dinner or a ticket to the movies. This would encourage the users to submit their thoughts.

Suggestions *G* and *H* are interesting also from a community creating point of view. Both these suggestions are probably concrete enough for others to understand and

reflect upon, and therefore potential subjects that can initiate a virtual community. In this way *Brainstorm* creates an opportunity for its users to choose the subjects that they want to be involved in by simply following step 5 to 8 in the schematic description of the *Brainstorm* application. This means that one effect of *Brainstorm* is that it can function as a meeting-tool that will facilitate the creation of new virtual communities.

The purpose of intellectual property law is to encourage creative thinking and innovation in society. This objective is mirrored by knowledge creation applications like *Brainstorm* whose main purpose is to encourage creative thoughts. Since the ideology behind both the application and the legal institute are so similar it is a shame that the letter of the law does not allow the application to be used without severely risking losing the beneficial effects.

The benefits of the *Brainstorm* application are intuitively apparent and therefore a situation should be created where the application should be implemented without the negative legal risks. To create the type of legal environment which allows this type of application there are several alternative approaches. The first approach could be to effect a change in the law. While this may seem to be an obvious step it is not particularly effective since this entails changing more than a century of legal development in many different jurisdictions. The resistance behind such a radical change is deeply rooted and strong.

There is an easier step to take and this would be possible if the courts decided on a new and up to date method of interpreting intellectual property law according to its original purpose. This method would entail that the courts would go against the letter of the law while defending its purpose. This is a method that is used in many situations and jurisdictions but it is also a method, which is difficult to orchestrate on a larger scale. To implement a change such as this would entail lengthy legal discussions between scholars and practitioners of the law. While such a discussion may be easily started its results and necessary time span is impossible to predict. This method is probably more complicated than attempting to change the law in all concerned countries since it is more subtle.

The third alternative is to solve the situation contractually. This method is more efficient since it allows the individual participants of the *Brainstorm* application to regulate ownership of information. The contractual situation is adaptable enough to be used in most situations. The downside with contractual situations is that it requires the users to settle all eventual disputes, even the unknown, in advance. The contract that manages to cover all situations could be referred to as the perfect contract. Among lawyers there can never be such a contract and any approaches toward it would entail an incredibly detailed documentation. The sheer amount of documentation would make the cost of drafting and controlling prohibitively high. The contractual situation is still the most efficient method and also the method, which can be implemented at the present time.

Summary

Knowledge is created in social interactions between members of communities. Information technology provides means for us to expand these communities to include individuals from outside our close vicinity. Essentially, this means that more experience and more information is made available to each member, which in turn increases the potential for knowledge creation. However, when leaving physical proximity behind and entering cyberspace we also enter a world where trust is replaced by competitiveness. Early findings from testing a creativity-enhancing prototype, *Brainstorm*, reveal that reward mechanisms and other issues of intellectual property rights may cause problems. This highlights the fact that legal issues have thus far at large been neglected. We might

find other problems lurking in the mud, awaiting detection, if only we dared to take a critical look at the field.

We do not mean to dismiss the field of knowledge creation as being overrated or unimportant. On the contrary, we share the common belief that knowledge will continue to grow in importance, and do therefore argue that by identifying and solving problems instead of pretending that they do not exist, we will be better equipped to face the challenges of the future.

The intellectual property law problems surrounding the *Brainstorm* are serious but not terminal. Since changing the law is both strenuous and time-consuming the solution is more likely to lie in the prudential use of contracts prior to commencing the use of the application.

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