

Driving Innovation Through Patent Application Review: The Power of Crowdsourcing Prior Art Search

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Worldwide filing of patent applications and the ensuing invalidation requests have seen staggering growth over the last decade. The result is increasing patent backlog, deteriorating patent quality and an uncertain economic environment. Patent application review is an integral part of the examination procedures undertaken by patent offices before a patent grant is given. Prior art search is a complex and time consuming part of this process. Crowdsourcing this critical stage is a valuable opportunity to render the patent application review process more efficient. This paper describes the crowdsourcing phenomenon and details how it can aid patent review. The open source review pilot projects of the USPTO and JPO are presented in order to assess the potential of opening prior art search to the wider community of experts and practitioners. Public-private partnerships between patent offices and companies managing online review communities are proposed as a valuable opportunity to leverage the benefits of open review while providing sufficient incentives and quality assurances to yield useful contributions.

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Innovation is a major driver of economic growth in modern economies and it is no secret that investment in new technologies occurs when investors believe they can profit from them. Patent protection provides the incentive to invest in this market by permitting a temporary monopoly in return for public disclosure of an invention. Yet, as the number of patent applications and patent invalidation requests continue to rise all over the world, patent office backlogs grow, patent quality deteriorates, companies operate under increasing uncertainty and the IP system begins to look stagnant.

Despite fluctuating growth rates, patent applications have seen a steady increase globally (Fig. 1)¹ and patent backlog has grown in most major markets (Fig. 2)².

With this staggering increase in demand for patent application review, can patent offices be reasonably expected to keep up with the pace and conduct the exhaustive prior art search necessary to ensure patent quality? The EPO is concerned about critical public reactions to the growing backlog of patent offices around the world.³ Multiple offices have sought to streamline the patent review process in response.

Increased harmonization and collaboration across offices has most often been the solution sought. However, increased information-sharing and shortened pendency times resulting from harmonization are not likely to improve the quality of the patents granted. So what could?

Tracing the evolution of business models in response to new technologies, Jeff Howe remarked in an article for *Wired Magazine* in 2006 that the age of the crowd is upon us.⁴ Crowdsourcing presents a new opportunity for organizations to solve complex problems. Communication technologies provide powerful tools to harness the collective intelligence of millions of individuals in online communities. It is time for the patent system to turn to the crowd for help and draw on its deep and diverse knowledge of prior art. Efficiently managed online communities may offer significant advantages over traditional patent application review for both companies and the public. So what is crowdsourcing and how can it help patent application review?

Why Tap the Crowd?

Crowdsourcing represents a shift in business models in response to a connected world. With well

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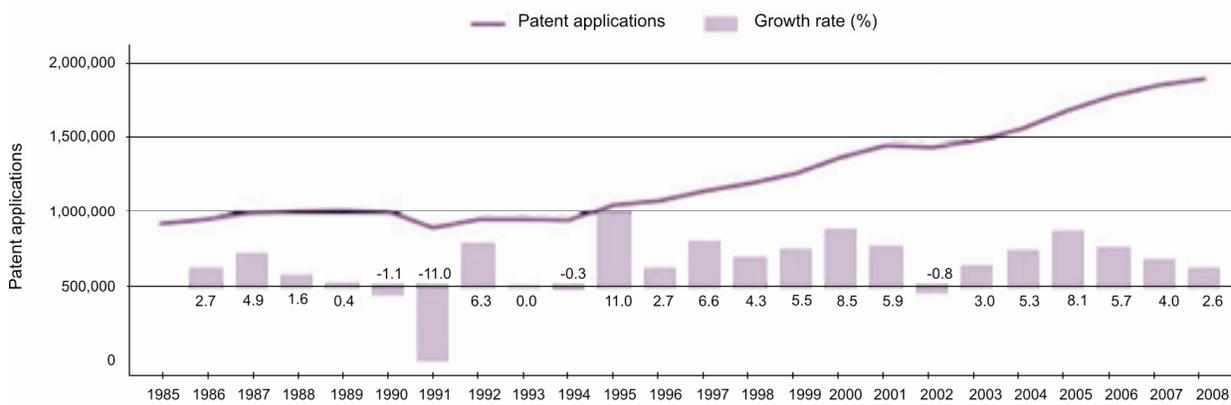


Fig. 1—Trend in total patent applications and patent grants

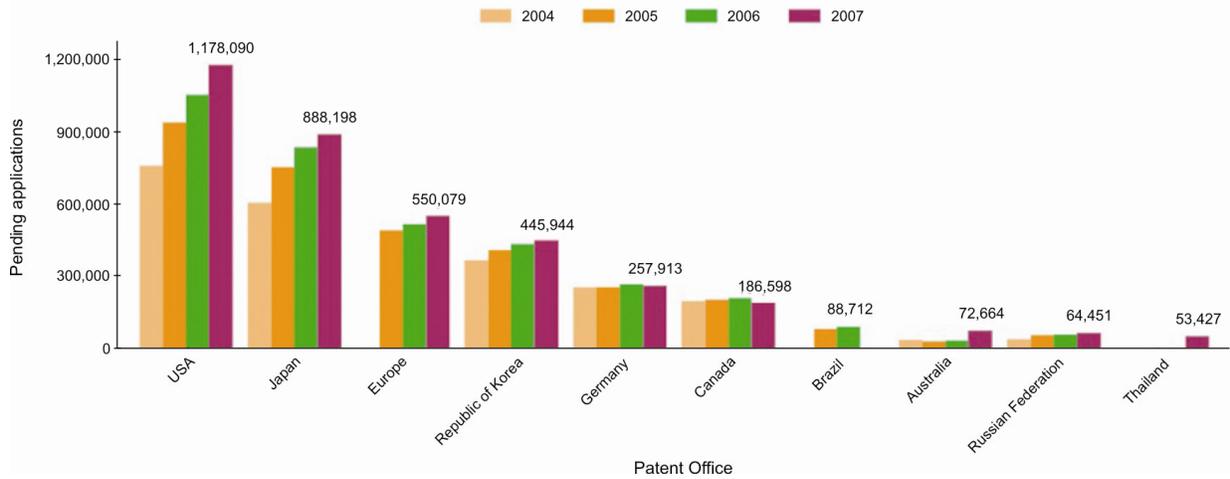


Fig. 2—Number of pending applications (> 50,000) with Patent Offices

over 1 billion Internet users and counting, around the globe⁵, it is hardly surprising that businesses are seeking to tap the wisdom and labour potential of this burgeoning crowd. Crowdsourcing, briefly defined, is when an organization outsources a task to a large network of individuals via an open call.⁶ Unlike open source, the final product of the collective labour of the group is owned wholly by the organization that initially made the request. The approach reaps the problem-solving efficiency benefits of open source while simultaneously providing sufficient incentives for participation in the project. It enables a business to harvest the ideas of a large group and reward the best contributions. It does not involve contracts (except confidentiality and user agreements in some cases), employee benefits to be paid or office overheads. A problem is solved and only the individuals directly contributing to its solution are rewarded. Business 2.0, pure and simple.

Drawing on a vast pool of individuals linked via technology, crowdsourcing an organizational function can solve highly complex problems because it combines a large and diverse range of expertise. Rather than a single department working on a problem, there is now a vast, worldwide pool of individuals working on it. But is asking a group of people to solve a problem simply inviting a solution that tends to the average intelligence of the group? Not in the case of crowdsourcing. The solutions provided are not achieved by averaging the intelligence of the group but rather by aggregating the creativity and expertise of each individual participant.⁷

Internet technologies enable online communities to pool ideas among culturally diverse, geographically dispersed individuals in a decentralized manner. Communication within these communities is highly participative, inclusive and multidirectional because of the ways in which technology breaks communication

and cost barriers, separating amateur enthusiasts from professionals. The instant exchange of ideas among an enormous group is aggregated by web technologies into a single output.⁸ The benefits of crowdsourcing will increase along with rising digital literacy levels, since more and more people can get involved and contribute effectively. Efficient solutions to highly complex problems can be found because computer software is powerful enough to perform a large amount of the tedious tasks associated with organizing and sharing information provided by multiple users. Targeting a labour pool by asking them to solve specific problems online increases their skill-sets and may stimulate entrepreneurship; crowdsourcing may even provide a forum for companies to headhunt skilled participants. Significant contributions made by users for free can lead to job opportunities for them. It is likely that, as this phenomenon gains further ground, the boundaries separating experts from amateurs (already disintegrating as Internet communities develop) will increasingly blur.

Crowdsourcing success stories have already occurred in many industries. Major pharmaceutical firm, Eli Lilly launched the Innocentive project in 2001 in order to link outsiders to internal research and development departments that were experiencing difficulty solving certain problems. Offering monetary rewards to whoever contributed a valuable solution that was used allowed more than 30 per cent of the problems posted on the website to be solved.⁴ That is 30 per cent more problems solved than there would have been without the open call. Threadless crowdsourced t-shirt designing and paid royalties on a sale-by-sale basis. Istockphoto crowdsourced stock photography and undercut an entire market. Dell's 'ideastorm' and Goldcorp's challenge are further examples of the power of this model when used appropriately.

Crowdsourcing Patent Review

Searching for prior art (material that would invalidate a patent application by undermining its claim to being novel or non-obvious) is a long and difficult process. The open source software movement is a testament to the power of drawing on experienced practitioners and amateur enthusiasts to spot mistakes and make improvements in software code. In the same way, practising scientists and individuals actively involved in innovative industries are very well placed to tackle the question of prior art search in patent application review.

Patent examiners are well trained but can they really be expected to effectively search all patent and non-patent literature relating to whether an invention is novel or obvious? Even patent office databases cannot compete with the knowledge of all individuals in a given domain. It may take an examiner hours, days, even weeks, to uncover material relevant to a prior art search that could have taken a practising scientist in the field a few seconds to recognize. Patent application review is a complex process but prior art search is a key node where it can be made more efficient.⁹ The current approach ignores the possibilities offered by web technologies. Organizations with centralized information systems may have possessed stronger resources for making accurate patent review decisions in the past but Internet technologies create the ability to instantaneously draw from a whole new pool of expertise.

Submitting an open call for specific prior art search in patent applications allows anyone interested to scan the request. If they have relevant information they can submit it. If not they move on. Social reputation systems (such as those of Ebay and Amazon sellers) incentivize positive contributions while unconstructive users are made irrelevant by their productive counterparts. Because individuals skilled in the art relevant to a patent application request can quickly identify prior art, meaningful input is provided with minimal effort to the individual. The power of crowdsourcing is in the sheer number of participants.

The Peer-to-Patent Model

Crowdsourcing patent review operates according to similar principles as the peer-to-patent model, which has already been tried in some patent offices. The experience of patent offices with this approach is worth learning from in order to understand where it can be improved. So how does it work? Participants submit prior art material and commentary in an online forum in response to pending application posts. Reputation in this online community is staked on productive and meaningful contributions. The information gathered by this open call is then transmitted automatically via specially designed software to the patent examiner in question. The examiner remains the ultimate judge for granting a patent but is now able to make his decision based on stronger evidence. More and better information yields more accurate patent application decisions. The result: stronger patent quality, more certainty for operating firms and greater confidence in the intellectual

property system. The public, meanwhile, benefits by avoiding the negative affects of private monopoly rights over undeserving products.

Crowdsourcing patent review is not just a fanciful notion fuelled by over-optimism regarding Internet technologies. Businesses are applying it and patent offices have already achieved results. The USPTO initiated the Peer-to-Patent project on 15 June 2007. Of the 40 applications submitted to the pilot project, 173 contributions relating to 36 cases were made by the community.¹⁰ While participation levels remained low, it still resulted in vital prior art submission that led to the rejection of 9 out of the 36 cases. Eight of these nine rejections were based on submission of non-patent literature that was not available to the patent office.¹⁰ Examiners, in turn, did not feel threatened by this community but actively welcomed their contributions and felt that full implementation of the project would benefit the review process. Twenty one per cent of the examiners said the prior art material submitted was inaccessible to the patent office and 79 per cent wanted to see a full-scale implementation of this project in the office. Importantly, 89 per cent believed the information was submitted in a useful and organized manner. 2000 people from over 140 different countries were registered users by the end of the pilot.¹⁰

The second anniversary report of the USPTO Peer-to-Patent project has more recently highlighted the benefits of such an approach as the community grows. Participating applicants increased 329 per cent in the second year.¹¹ Applications submitted rose from 71 in the first year to a total of 187 by 30 May 2009 and there were over 74,000 visitors to the website from 161 territories. In total, the USPTO used prior art references from the Peer-to-Patent project in order to reject one or more claims in 18 patent applications.¹¹ Despite growing discussion among stakeholders about the value of the peer-to-patent approach and growing participation by industry, budget pressures have led the USPTO to discontinue the project. Considering that the Patent Reform Act was passed on 8 March 2011 in the US Senate at a 95-5 vote, and in light of the fact that the USPTO pilot projects elicited so much positive response that the USPTO director called it a 'gateway to add more value' to the patent system, it is surprising that more is not being done in this direction.¹² There is little doubt that open review of patent applications has serious advantages for the timely and relevant uncovering of prior art.

In a renewed effort to test the scalability of the peer-to-patent model, the USPTO initiated another project in collaboration with the New York Law School that would increase the total applications permitted in a wider scope of technology domains. This pilot is running since 25 October 2010 until 30 September 2011. Increased awareness of this programme has also led to the recent establishment of Peer-to-Patent UK by the UK Intellectual Property Office on 1 June 2011. The results of these pilots will provide more material to assess the impact of the model.

IP Australia and the JPO also established their own open peer review system for patent applications in response. The JPO experienced similar results: a positive experience of the benefits of the approach but a lack of sufficient participation.¹³ Peer-to-Patent Australia's project had a narrow subject matter that only included business method patents. This was initiated because it was felt that adequate searchable prior art literature in this subject area was not available. This project garnered prior art references not discovered by examiners in 8 of the 31 applications despite attracting only 40 active contributors.¹⁴ The team in charge of the project concluded that, like the USPTO and JPO initiatives, the pilot confirmed the hypothesis on which it was predicated (namely that open review improves the quality of information available to examiners). However, reflecting on possible improvements, the report states in its conclusion that 'there must be incentives, possibly economic, to encourage the key technology companies who employ skilled and knowledgeable technologists to embrace and participate in the peer review process.'¹⁴ The major problem for all three of these pilots was stimulating sufficient participation in the project from the international community of scientists and practitioners. A consistently suggested solution was to create incentives to build up a community and make profiles public to enhance quality. The vital question is how to motivate this vast pool of individuals to participate in order to tap their useful expertise?

Partnership Possibilities

While it is pivotal that decision-making authority in patent application cases rests with public authorities, there is no reason that private resources cannot alleviate the burdens of patent offices. The pilot review projects mentioned above are examples of an open source approach to patent review. An important lesson to draw from their experience is the

need for greater participation levels. High-tech software and elaborate organization can only go so far if there is not adequate input from the crowd. A system of social rewards builds status incentives into a network of users. It stimulates individuals' motivation to ensure high quality contributions relevant to the call for material. Ebay's trusted buyers and sellers scheme and Amazon's star qualifications are good examples of this. However, crowdsourcing patent review may succeed where open patent review falls short. It can do so by offering material incentives to contributors. Rewards stimulate participation. But it is more than just social rewards that are needed. Look at Innocentive, iStockphoto, Threadless and Goldcorp. Goldcorp offered over US\$ 500,000 to the 25 finalists of their 'GoldCorp Challenge' (participants were asked to examine geological data and determine potential mining targets). The program quickly attracted over 475,000 hits online with more than 1400 registrations across 51 countries.⁶ Incentivizing contributions can help attract a greater crowd while the private management of an online community maintains quality control.

Providing material incentives is a critical difference between crowdsourcing and opensourcing. Yet private management has other benefits too. Online communities can be costly to monitor. They must be consistently policed to ensure high quality contributions. A private company whose reputation is staked on the quality of community output can greatly reduce the burden on public authorities of doing this. Since all information shared on the network must comply with relevant IP law, privatization of the management process insulates public authorities from responsibility. Information from academic journals cannot be reproduced without permission and subscriptions are often expensive. Statutory exemptions exist in some cases for patent office distribution as long as the relevant disclaimer on non-distribution is attached. With infringement lawsuits posing a serious risk to this approach, it could be greatly beneficial to grant selected third-parties a similar exemption, provided they are legally bound to protect the information disclosed on their networks. Private systems rely on their integrity to attract customers so they have every reason to enforce high standards of practice. Total privatization of patent application review is obviously not an option. Patents are a private monopoly granted by government authority to ensure the public disclosure of inventions

for the benefit of the people. Patent decisions must remain a public responsibility. But why not combine public and private capacities in the case of prior art search if it could improve efficiency?

There is the obvious concern of cost. As patent offices face considerable budget constraints, there will be reluctance to pay third-party private sector organizations for their services. Since the Peer-to-Patent project was initially discontinued for financial reasons¹¹, patent offices are unlikely to look to the private sector for help in an austere financial climate. In Europe, the prior art search component of patent office work has traditionally operated at a loss and is subsidized by the income accrued from renewal fees. With no additional sources of income to counter this new cost, will patent offices willingly outsource this component of patent review to third-parties that will no doubt be more expensive than the in-house alternatives? These are important considerations. However, the systemic benefits of crowdsourcing prior art search along with the operational advantages it offers patent offices in the long term should outweigh the financial cost of implementing it. It is also likely that, as the burden of patent backlog grows, the long-term temporal and financial costs on patent offices associated with training and hiring more patent examiners could be partially offset by outsourcing the process. If seeking to increase the value and efficacy of their operations, this is a crucial node where patent offices can achieve tangible results.

Conclusion

The crowd's expertise should be brought to bear on prior art search. Low quality patents are a serious and unnecessary burden on modern economies. Continuous growth in patent applications every year has put enormous strain on the IP system. Prior art search is an integral and complex part of the patent review process. As the workload on patent offices skyrockets, partnering with private actors to crowdsource prior art search may represent an ideal situation for all involved. Public actors retain ultimate decision-making authority. Private actors profit by taking over some management responsibilities. Individuals contributing in the review process reap financial and social rewards. The public benefits from a higher quality of granted patents. Crowdsourcing prior art search could be one of those rare situations where everyone wins. It may be the crucial point where the patent system can be revitalized. There is little to lose and so much to gain.

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