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Peer reviewed

Bringing Peer Review to Patents**by Mario Biagioli**

Abstract

Tougher examination of patent applications reduces anti-commons effects while reducing the frequency and costs of litigation. Modelled after open source/free software collaborations, the "Peer to Patent" initiative seeks to improve the quality of patents by developing a Web-based infrastructure whereby volunteer experts external to the PTO's review applications, assemble prior art information, and submit the results of their collective work back to the Patent Office examiner. This paper endorses the spirit and goals of the "Peer to Patent" initiative, but questions its reliance on the open source model. A discussion of the functions of peer review, the meaning of peer, and the motivations of the reviewers in different contexts indicates that editorial peer review — not open source — can provide a more effective model for integrating peer review of patent applications into PTO practices.

Contents

[Whose peer?](#)[Editorial peer review v. patent examination](#)[Looking for motivation between collaboration and competition](#)[Reviewing for those who cannot be there](#)

Modelled after open source collaborations, spearheaded by Beth Noveck, and endorsed by the 2006 *Gowers Review of Intellectual Property*, the "Peer to Patent" initiative is a good example of the return of the repressed [1]. About a month before the passing of the first U.S. Patent Act in April 1790, a preliminary bill already contemplated a form of patent peer review. It stated that, upon receiving a patent application, the Secretary of State:

Shall make out an advertisement, to be inserted by the petitioner in one of the news papers published at the seat of government of the United States, and in one of the news papers published in the State where the petitioners shall reside, for the term of eight weeks, once at least in each week, giving notice of such application, and containing a short and general definition or description of the invention or discovery, requiring all persons concerned to appear before the said Secretary of State [...] not less than forty-two days, nor more than ninety days next following, to shew cause why letter patents [...] should not issue... [2]

The bill made no mention of *ex parte* examination by government officials, implying that the patent would automatically issue in the absence of peer opposition. But if,

Upon the notice so as aforesaid given, any person or persons shall appear before the said Secretary, and shall shew cause as to him shall appear reasonable, why letters patent [...] should not issue to the party petitioning for the same, and the petitioner doth not acquiesce in the opinion of the said Secretary, the petition shall be referred to three judicious, disinterested persons, to be mutually chosen by the parties, or if they do not agree in such choice, to be appointed by the Chief Justice of the Supreme Court... [3]

The bill did not pass and, shortly after, the first U.S. Patent Act introduced a very different approach to patent examination. It included no provision about the advertisement of

summaries of patent applications, the request of information about unknown prior art from interested third parties, and the pre-award, out-of-court arbitration by a panel of three experts reporting to the Secretary of State. The first Patent Act completely removed the function of patent examination by peers and attributed it to the government [4]. It also replaced pre-award arbitration with post-award litigation by stating that "within one year after issuing the said patent" opponents of the patent could ask the judge of the District Court where the patentee resided to review evidence that he "was not the first and true inventor," and that the court could render a judgment on the matter [5]. The basis of today's system of patent litigation was thus established.

Constraints imposed by contemporary technologies of communication played a substantial role that decision. The 1790 Bill required the applicant to publish an abstract of the application in at least two newspapers at least once a week for eight weeks. The drawbacks of the less than capillary diffusion of such notices (likely to be missed by anyone who did not happen to live in those cities and to read the paper with care every day) were compounded by the further burdens imposed on the external reviewers who were required to travel to deliver evidence of prior art *in person* to the Secretary of State.

Radical changes in novelty requirements also contributed to the early demise of peer review of patent applications. While the March 1790 bill stated that inventions had to be not "known and used in the United States" in order to be patentable, the Act passed a month later redefined novelty in absolute terms, not just novelty within the U.S. [6] The much tougher novelty requirement driven by the political need to differentiate patents from ancient regime monopolies could have been hardly implemented by polling prior art (which now included also foreign knowledge and use) only from the limited number of people who happened to read small notices in two newspapers, one of them likely to be a provincial publication.

In the absence of a suitable communication infrastructure, it makes sense that the 1790 Patent Act dropped a very local and restricted form of patent peer review in favor of a model of *ex parte* examination coupled with post-award litigation. By the same token, it seems unwise to still hold on to a system that may have been introduced because of infrastructural limits that are no longer with us today. Without going so far as to say that the figure of the patent examiner was a mere by-product of the absence of cyberinfrastructure in 1790, it is safe to argue that the emergence of that role resulted not so much from legal theory but from mundane considerations about how to get to prior art given the constraints imposed by communication technologies at that time.

But if history lends support to a return to the peer-to-patent model, it also shows how slippery the definition of peer can be. The "peers" envisioned by the 1790 Bill were nothing but competitors of the applicant. No attempt was made to say that they were motivated by a desire to improve the patent or to gain the respect of their fellow peer reviewers, or that they should have been rewarded by something other than the invalidation of the application. The peer reviewers of the 1790 Patent Bill were more like the "bounty-hunters" envisioned in some recent proposals for the reform of the patent system [7].

The peer-to-patent initiative, therefore, is definitely on the right track in addressing the problem of retrieving relevant prior art (especially non-patent art), but less so when trying to envision the motivation and rewards of the peer reviewer and the relationship between the peer reviewer, the examiner, and the applicant. The available models for the motivation and reward of participants in open source/free software environments do not seem to fit peer-to-patent scenarios very well — the main difference being that the patent would *not* be shared by those who help to review its application and improve it [8]. If we use Rishab Ghosh's image of open source exchanges as a "cooking-pot market," then the outcome of the peer-to-patent collaboration could be distinctly anomalous by open source standards: many peers contribute many ingredients to the communal soup, but the patent applicant dashes off, alone, with the full pot. Along the same lines, one can doubt whether the open source ethos of collaborative production can be translated into a project that is essentially about criticism. Current discussions of the peer-to-patent project emphasize a commitment to "making a patent stronger" (a constructive goal), but that does not seem at all separable from the possibility of "killing the patent" (a critical goal).

Recent assessments of the patent system have pointed to the problems created by holding on to one-fits-all notions of invention that negate the radical differences between the products of innovation in different fields such as pharmaceutical research and software development [9]. It would be unwise to reproduce similar problems by treating peer review (or, for that matter, open source) as some kind of universal principle of collaborative knowledge production applicable to all sorts of different scenarios. Literature on the peer-to-patent initiative has indeed addressed the existence of different peer review systems by contrasting the practices of federal agencies with those of open source environments, but has ultimately treated them as

varieties of the same species [10]. But if we consider a wider range of peer review practices, it quickly becomes clear that we have varieties all the way down, and that it is virtually impossible to find a context-independent definition of “peer.”

Whose peer?

When one says “peer,” the image that comes to mind is that of a colleague, someone with comparable skills and expertise, someone one can work with. These also happen to be the traits of competitors — unethical competitors included. For instance, the 1836 Patent Act that established the Patent Office and its bureaucracy also ruled that none of its employees could develop financial interests in the patents they were reviewing [11]. This was a fundamental improvement because, until then, applicants could count on little or no confidentiality. The attempts by early modern inventors to file descriptions of their inventions only *after* the grant of the privilege probably reflected the justified distrust they had not only for competing inventors but also for the clerks and technicians who handled their applications or the courtiers who facilitated the granting of the privilege [12]. In the interest of the applicant, the firewall introduced by the 1836 Patent Act was aimed precisely at limiting the ways in which the examiner could be a peer of the applicant by drawing a legal line between their roles.

Prior to the development of institutional safeguards, scientists too had reasons to fear their peers. When in 1675 Christiaan Huygens decided to publish a report of his revolutionary spring watch in the *Philosophical Transactions* — perhaps the first peer-reviewed academic journal — he first sent an anagram of his discovery to the editor, following up with a paper only after he received a letter from the editor acknowledging the receipt of the cipher — a system not unlike the one used by Galileo himself to communicate some of his discoveries to other mathematicians [13]. Similarly, it was not uncommon for scientific practitioners to have doubts about the integrity of scientific academies to which they were entrusting their priority claims through sealed notes to their secretaries [14]. Data assembled by the NIH Office of Research Integrity shows that the majority of cases of plagiarism result from peer review of manuscripts and grant applications [15].

These are by no means common occurrences, but they do indicate unavoidable tensions surrounding the meaning of “peer” within peer review scenarios. They also do not conform to the narratives of happy sharing one finds in popular discussions of open source communities. I am not at all saying or thinking that peer review is plagiarism’s twin or that open source practitioners do not practice what they preach. I rather believe that the fact that no case involving of GPL or GPL-derived licenses appears to have been litigated to judgment (while we have, instead, numerous cases of peer-review-based plagiarism in federally funded science) does not mean that open source practitioners are more honest or less litigious than common scientists, but simply that they inhabit different economies of innovation that hinge on very different notions and modalities of distribution of credit and property [16]. It’s worth noticing that these differences are not reducible to the mere presence or absence of property in the products or claims being reviewed or produced. After all, the open source model is rooted in the affirmation of copyrights by the author (if only as a means to then grant public licenses to that product), while publication credit in science does not hinge on the author’s property rights in his/her text [17]. There is, in sum, no privileged relationship between peer review and either open collaboration or unethical competition (or between property rights and either openness or secrecy).

The same may be said about technology. Electronic communication is both blamed for multiplying the opportunities and pace of plagiarism and praised for creating the possibility for electronic scientific publications that can bypass editors, peer reviewers, and the delays that inevitably accompany the review. But if it is silly to blame technology for plagiarism (something that has nevertheless been done since Gutenberg), it is equally problematic to say that electronic publications are rendering peer review obsolete. If particle physicists working in large collaborations post so-called unreviewed articles on free-access servers, it is because those texts have been reviewed in-house by many (possibly hundreds) of colleagues who, given the level of specialization of the field, may represent as substantial percentage of the field itself [18]. In this case, the absence of a traditional peer review process is not just a result of the possibility of quick electronic publications, but of the relocation of the review function elsewhere within the publication process.

Other examples show that the importance placed on peer review reflects perceived risks of scientific misconduct. Biomedicine has had the highest frequency of fraud and misconduct and,

not surprisingly, it is also the field where the workings of peer review are most carefully studied and improved. By contrast, fields where responsibility to the public or to federal funding agencies is less of an issue (or where practitioners incline toward a career in the private sector) tend to be less concerned with peer review, which they probably perceive as either an unnecessary constraint or just a waste of time [19].

Underneath such field-specific differences, we see that (1) peer review plays a central role when the authors' *responsibility* toward other people or institutions is at stake, and (2) that when peer review works it is because it is *not* completely open or collaborative. The peer who has the skills to review has also the opportunity to appropriate what s/he reviews — a possibility that needs to be controlled by adding institutional safeguards. In editorial peer review that role is played by the editor — the person who accepts or rejects the suggestions of the reviewers, maintains firewalls between the reviewer and the reviewed, and helps to keep the reviewers honest by, among other things, being witness to the fact that the reviewer had access to certain manuscripts or grants applications at a certain point in time [20].

In a more vestigial form, the open source/free software model displays this feature too when it relies on the role of the maintainer — the person who has the right to approve the patches and distribute modified versions of the collectively produced software — the person who, like the editor, “publishes” the collective work of peers [21]. Even Beth Noveck's peer-to-patent initiative features something of an editor or maintainer. The project's “Use Case Model” introduces the figure of the moderator, which it describes as a “member who has approval authority for content under review on the Web site. The moderator's role is narrowly defined as a person who checks postings for obvious policy violations such as spam, copyright violations, or inappropriate content.” [22] That does not seem to involve a great deal of authority, but a few pages later we see that the moderator is also in charge of accepting or rejecting prior art submitted by peer reviewers in relation to a pending patent application — a pretty powerful, editor-like gate-keeping function [23].

These examples do not simply indicate that “somebody has to be in charge,” but that, in the case of peer review, the process needs to be managed by someone who is a peer of the reviewer and of the reviewed in some ways but not in others. S/he needs to have comparable skills to those of the reviewer and the reviewed (s/he should be a peer by expertise), but ideally s/he should make a living in ways that would not bring him/her in either alliance or competition with either the reviewer or the reviewed. That is, s/he should not be their peer by socio-professional role. As mentioned, the role of the patent examiner has developed to match these requirements.

Furthermore, it is crucial to recognize that the person who stands between the reviewer and the reviewed also stands for other constituencies — journal readers, research sponsors, taxpayers, etc. We could say that s/he stands in *between* those two precisely because s/he has to stand in *for* others. The editor or grant program officer (or any other similar figure) are not there only to make sure that the appropriate safeguards are maintained between the reviewer and the reviewed, but also to represent the interests of other relevant stakeholders. The very logic of any review process is that there are such remote constituencies who, while having legitimate interests in the matter at hand, cannot be there to assess it themselves. Discussions of peer review, however, tend to rely on a meaning of peer that's quite unspecific and blurs the differences between peer-by-expertise and peer-by-role, as well as those between peer as collaborator and peer as competitor. (They also tend to understate the role of the remote stakeholders).

Open source peers may function as independent collaborators motivated by developing a product of mutual interest, but scientists who operate in an economy of limited publication credit have learned to collaborate and trust each other out of need, not love. Trust is the result of a double negative: scientists trust each other because they *cannot* not trust each other. They are interdependent because they cannot be independent. Most of them agree to depend on their peers' assessment because they feel they have no other better source of assessment, no better way to regulate access to resources and rewards — resources that are typically provided by stakeholders *external* to the scientific community. In that context, collaboration does not exist in and of itself, but only as the other side of competition within a framework of interdependence. We could say, then, that while open source and free software collaborations are driven by the participants' shared interest in a product or tool, the kind of collaboration one finds among scientists engaging in peer review reflects not only an investment in the claims being reviewed, but also — and perhaps even primarily — a shared interest in sustaining a certain infrastructure (publication system, grant allocation, etc.) necessary to the whole community.

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Editorial peer review v. patent examination

Having indicated that peer review can be quite different from open source kinds of collaboration, I now want to compare and contrast the function of editorial peer review with that of current PTO patent examination practices. My goal is to show that some of the weaknesses of the current patent application review system may be best corrected not by adopting an open source or wiki-style review process, but rather by aligning PTO practices to the kind of peer review used by academic journals.

As currently defined, the role of the patent examiner differs from that of the journal editor in that s/he does not rely on external referee reports. Setting this key difference aside, the review process for patent applications is comparable to that of manuscripts, while remaining quite different from that of open source collaborations. Patent reviewers and manuscript reviewers *do not help to construct* a product as, instead, open source participants do. Their role is and ought to be that of *selection*: to select only those manuscripts worthy to be allocated precious publication space (or precious readers' time and attention), and to select only those patent applications meeting statutory requirements, that is, applications that are worthy of being awarded temporary monopolies. Their methods are not identical but comparable, involving the comparison of applications and manuscripts with other texts — prior art or scientific publications [24]. Finally, the value of a patent lays more in the future than in the present, not unlike the way a publication benefits its author through the resources it may help to secure in the future — jobs, fellowships, grants, etc. Because of the review process they undergo, both publications and patents carry an imprimatur of quality that may open up future opportunities (unlike grants that provide immediate financial awards).

These analogies turn into paradox when we realize that patent examination is not as rigorous as that of manuscripts or grant applications submitted to journals or funding agencies despite the fact that the stakes in the former are substantially higher than in the latter. Patents, in fact, provide something that is substantially more powerful, in kind, than what is provided by a publication or grant. The PTO does not simply grant *resources* (funds or publication space), but *exclusionary rights*.

Any time an examiner lets through claims that are not fully novel and non-obvious, a monopoly is created on something that already belonged to the public. By contrast, the worst thing that can happen when editorial peer review fails is that some space in a privately owned journal gets misused or simply not optimally used. And if the review is too strict, leading to a rejection, the author can simply resubmit to a different journal (though one that may have a lower impact factor). Furthermore, if a scientist receives a grant from a federal funding agency, s/he is required to deliver something close to the goal listed in the application. The award of a patent, instead, does not require the patent-holder to do anything with it. S/he may even chose to wait to be infringed [25].

At least in principle, patent examination should be less contentious than the review of manuscripts or grants. The latter has a conservative bias when it comes to assessing substantially new directions and claims because the acceptance of the manuscript or grant proposal automatically implies some degree of *endorsement* of the new claims by allocating resources to them. With patents, instead, novelty, utility, and non-obviousness need simply to be *recognized*, not endorsed. It is up to the patentee to mobilize resources around the patent so as to turn the invention into something workable and marketable. This potential advantage, however, does not seem to carry, suggesting that the weaknesses are elsewhere.

Journal editors tend to be senior practitioners with broad knowledge of the field and a good map of competent peer reviewers they can rely on. (It is said that a journal's biggest asset is the quality and size of its pool of reviewers). But as smart and hard-working patent examiners may be, many are junior practitioners with limited research experience — if any. (The current steep hiring surge at the PTO to cope with massive backlog is bound to amplify that). Typically, patent examiners evaluate applications by themselves and tend to focus their prior art searches on patents rather than publications [26]. They also need to watch their time, as their rewards are linked to productivity. But despite these constraints, the PTO does not seem as discriminating in giving out patents as the editor of *Nature* or *Science* are in allocating space in their journals.

While editors need to maintain or improve the impact factor of their journals — an index based on the number of citations per article, not on the sheer number of published articles — the PTO benefits from the quantity of patents it grants, through maintenance fees [27]. Competition (or lack thereof) does not seem to affect review standards in a predictable manner. The PTO's

complete monopoly on the granting of patents does not make its standards any stricter, while the competition for top articles among journals does not result in relaxed review standards but rather in promises of speedier publication.

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Looking for motivation between collaboration and competition

With these considerations in mind, let's return to Noveck's peer-to-patent initiative. In its current incarnation, the proposal looks like a self-contained open source graft on the standard patent examination process — a bazaar grafted on a cathedral. It's up to the applicant to decide whether to direct the application to the peer review pilot program, and it is up to the patent examiner to accept or reject the evidence and comments offered by the peer-to-patent community. Given its voluntary and "added on" nature, it would be unlikely for the pilot program (to be launched in 2007) to generate conflicts between the interests of the voluntary peer reviewers and the institutional culture of the PTO. A more serious concern is that the reviewers may not be sufficiently motivated to collaborate, especially given that the rewards currently envisioned are of a purely symbolic, non-monetary nature. The organizers' efforts seem to be appropriately focused on enticing people to collaborate, also by allowing them to operate pseudonymously so as to reduce whatever liabilities (real or imagined) they may worry about [28].

Possible lack of motivation among reviewers is more of a concern in the wake of the marginal success of *Nature's* 2006 Web-based pilot program of unsolicited review of manuscripts — a program that is in some ways comparable to the peer-to-patent initiative. While *Nature's* editors have no problem enlisting referees in the traditional peer review process, their experiment with open review has been marred by low and under-engaged participation and has been discontinued after a six-month trial period [29].

Taking a hint from *Nature's* experience, one could bypass the problems of a possible under-participation in the peer-to-patent initiative by directly incorporating peer review into PTO practices, using editorial peer review as a model [30]. The PTO examiner would remain in control of the overall evaluation process (in the same way that a journal editor is in charge of the processing of a manuscript from review to revision and, perhaps, to publication), but s/he would no longer function simultaneously as an *ex parte* fact-finder and evaluator. Nor would s/he continue to work in relative isolation. The patent examiner would still pass a judgment on the application, but have to do so by relying on the reports and evidence provided by external peer reviewers — inputs that s/he would then weigh in the same ways journal editors do.

According to the peer-to-patent initiative, the PTO is free to use or dismiss the evidence and comments provided by peer reviewers — a reasonable stance given that we are dealing with a pilot project. But if we abstract from the contingencies of the current experiment to take a more long-term perspective, it seems that patent review could become more effective by making the PTO's reliance on external peer reviewers mandatory, not optional. Hoping for (but not taking for granted) the availability of voluntary peer reviewers to comment on every application, the PTO examiner could request reviews from specific external experts. The examiner, therefore, would rely on both commissioned referee reports as well as on the information that may be generated by Web-based systems of open peer review like those proposed by Noveck. The two models could in fact operate in parallel, allowing for a stronger alignment between patents and the knowledge of the relevant research community — the kind of alignment briefly envisioned by the March 1790 Patent Bill but never accomplished because of the lack of a suitable communication infrastructure.

It is safe to assume that conflict of interest will sometime emerge between the patent applicant and the peer reviewers (no matter whether they are enlisted by the PTO examiners or volunteer their knowledge through peer-to-patent initiatives). Patent peer reviewers may have financial stakes in the issuance or denial of a patent in the same way some authors and reviewers of manuscripts submitted to biomedical journals may have financial ties to pharmaceutical companies, and be thus motivated to push for the acceptance or rejection of their publication. But while it would be naïve to claim that the problem of conflict of interest has been successfully conquered, the guidelines adopted by hundreds of scientific journals at least indicate that editors have learned a lot about mapping and controlling its effects — knowledge that could now be transferred to patent examination scenarios [31]. (Of course changes would have to be introduced in the law to avoid the liability of reviewers to possible

subsequent charges of wilful infringement on the basis of their familiarity with the application). Equally important are questions regarding the blindness or openness of the patent review, the applicant's access to the reviewer's name, and the public availability of the review, but here too the PTO could rely on the peer review practices of journals and federal funding agencies.

In any case, we need to keep in mind that conflict of interest is not the same as competition. One of the strongest arguments for the effectiveness of editorial peer review hinges not only on the reviewer's expertise but on the fact that, being a potential competitor of the author, the reviewer may have a direct incentive to be a strong critic. Some sociologists have argued that peer recognition is such a precious asset in science precisely because it comes from peers who *would have rather withheld it* but could not find sufficient grounds to do so [32]. It is therefore puzzling that the PTO calls patent applicants "customers" and represents itself, in no unambiguous terms, as an institution committed to help inventors get patents rather than to prevent weak applications from going through [33]. That would be a bit like seeing a scientific journal proudly state that its primary goal is not to publish top quality articles but to help scientists put out their work and get authorship credit for it, or for the FDA to say that its mandate is to help pharmaceutical companies get their drugs approved rather than make sure that no unsafe or ineffective drug is allowed to market [34].

The PTO's self-representation is problematic on both political and epistemological grounds as it implies not only a privileging of private interests over the public good, but also the potential support of an institutional culture tolerant of weak patent reviewing practices. If we agree that innovation is inextricably tied to knowledge production that has to survive tough review to be deemed robust, then why is it that equally exacting standards are not applied to decide what innovations should be protected by patent rights?

Proponents of free software and open source models of knowledge production may object to my emphasizing competition over collaboration, citing a range of examples demonstrating that competition is not inherent in all forms of knowledge production. Far from critiquing the principles of their model and its wide applicability, I simply want to stress that while knowledge production and review may go hand in hand in wiki-style scenarios, they are quite separate (and necessarily so) in editorial peer review or in patent examination. Their distinction is actually sharper in the context of patent applications than in that of scientific manuscripts, casting some informative light on the different motivations of those who participate in these two kinds of reviews.

The peer-to-patent initiative assumes that the reviewers will be motivated by an open source ethos of collaboration, and will therefore volunteer their time and skills in exchange for recognition by the other fellow reviewers — a recognition that may then be translated in job opportunities and rewards in contexts that are external to the collaboration itself. But if we look at editorial peer review we see that peer recognition accounts only for some of the reviewers' motivations. No doubt, journals and funding agencies depend on and appreciate good reviewers, but that's not going to translate automatically into important professional rewards. More likely, those who review proposals and manuscripts do so largely because they recognize the interdependence among practitioners, as well as between practitioners and their institutions.

I may agree to review a manuscript you have submitted to a journal not so much as a collaborative gesture toward you but because, when I submit a manuscript myself, I expect the journal to find somebody to review it, hopefully with the same care I am putting in it now. Furthermore, if I decide that your article should not hit the "reject" pile (that is, if it becomes apparent to me that I cannot not lend you some credit), I then have a motivation to making your piece as strong as it can be so that I can later use it, with appropriate credit, in my own research. We could say that editorial review is a primarily critical process that turns constructive and collaborative only (and only in limited ways) if the manuscript makes it over the rejection threshold. The guiding assumption of both editors and reviewers is that not all submissions can be published or "collaborated with."

In my view, the peer review of patent applications entails an even sharper distinction between knowledge production and review (and thus a much reduced area of possible collaboration between applicant and reviewer) because the reviewer would have very little motivation to contribute to the patent at all. While reviewers tend to take a critical stance toward manuscripts they are asked to review, they also have some motivation to make them better because, in the end, the articles will be accessible and usable by the reviewers as well as by all other practitioners. But it would be quite different to collaborate in a patent application review process whose likely result would be the granting of IPRs to the applicant — rights s/he might be able to translate not only into substantial financial benefits but also into obstacles to the reviewer's own work and research, that is, into anti-commons effects [35].

As one progresses from open source collaborations to patents, the interdependence between producers and reviewers decreases, the reviewers are rewarded more and more by constituencies that are not directly involved in the knowledge production process (editors, publishers, funding agencies), and the function of the review becomes increasingly that of filtering. Along the way, the currency of the reviewer's reward goes from professional recognition to money. Open source practitioners, for instance, are willing to offer their skills and labor in exchange of recognition from their close collaborators as well as free access to a complex product or tool they could not have produced by themselves. Scientists and scholars participating in editorial peer review tend to receive recognition (and occasional small honoraria) not from fellow practicing scientists but from editors or publishers [36]. While the reviewers may collaborate (but only indirectly, through the editors) with the authors to improve their work and make it more useful to the community, their task is predominantly one of gate-keeping. The trend gets only sharper when we get to patents.

In that case, neither the patent examiners nor the possible peer reviewers of patent applications should have any collaborative relationship with the applicant and should not receive any meaningful recognition or reward from him/her. Patent examiners are not patent agents. Furthermore, while journals are part of the infrastructure of the scientific community, the PTO is a governmental institution that charges fees for reviews (unlike journals) and may grant exclusionary rights (unlike journals). It is therefore unlikely that external patent reviewers will feel moved to volunteer their work to maintain good relations with an institution they do not run, or to help the applicant develop resources s/he might turn against the reviewers themselves. As collaboration ceases to be part of the rationale for the review process, one would expect the reviewers to be paid for their services — as patent examiners are — given that the PTO already collects fees from applicants for services that could be now farmed out to such external experts.

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Reviewing for those who cannot be there

The role that relations between people (collaborators, editors, reviewers, etc.) play in open source collaborations and editorial peer review seems to be replaced, in the context of patent examination, by the payment of fees for reviewing services and for the possible granting of IP rights. This is not, however, just another example of the transformation of collaborative personal relations into cold cash transactions and property signposts. If we take a second look at the spectrum going from open source collaborations to the peer review of patent applications, we notice a direct correlation between the increasing selective function of review and the fact that the beneficiaries of such a review cannot participate in it.


The reviewer's function becomes more and more that of gate-keeping when s/he is asked to represent interests that are not exclusively his or hers, that is, when s/he is asked to represent stakeholders who, for a variety of reasons, cannot act as reviewers themselves. For instance, if criticism does not seem to characterize the ethos of the participants in open source collaborations it is not because they are not critical of what other collaborators may be doing, but rather because they work with them right there — even though the "there" might be a virtual space — at a product they are co-producing and sharing. Criticism takes place but does not stand out because it is absorbed within the activities of the collaboration as the various participants switch, depending on the circumstances, between playing critics and producers. Furthermore, the collaborators work and speak for themselves and their interests (not those of others) as they collectively push the project along through countless negotiations.

Instead, journal referees or reviewers of grant proposals appear critical simply because they have been asked to participate in the allocation of scarce communal resources — resources that are not just theirs. They are also asked to speak for other constituencies — the discipline, the funding agency, the scientific community, etc. — that cannot act as reviewers themselves because they do not have the necessary skills or simply cannot be there. Furthermore, the reviewers come to play a role that is essentially about gate-keeping and selection as a result of being brought in *after* the manuscript or proposal has been produced — not *during* its production — that is, at a point in time in which they could no longer act as collaborators and co-producers even if they wanted to. Having not been part of the production process, the reviewers (and the stakeholders they represent) can only say "yes" or "no" to what the author has submitted.

For these reasons, I believe that the reviewers' role could be better described as "non-collaborative" rather than "critical." The adjective "critical" conjures certain kinds of

motives and dispositions, but the inherently non-collaborative nature of the reviewers' role results not from dispositions or values but from very material circumstances. Peer review is always, in one way or another, connected to the exercise and assessment of responsibility — a responsibility that is typically framed by the language of personal or professional ethics. But ethics and values are not the root cause of why we worry about responsibility in knowledge claims to begin with. Responsibility emerges as an issue because of mundane but insurmountable constraints. Because collaboration can only be limited in space and time, there may be relevant stakeholders (down to the lowly taxpayers) who could not participate in the collaboration and cannot review its results now.

As difficult as the role of the editorial peer reviewer may be, the reviewer of a patent application is expected to perform an even tougher feat. The technical challenges posed by this task are well known to anyone who has spent any time thinking about that extraordinary legal construct called "the person skilled in the art" — an imaginary "peer reviewer" with expertise in a possibly very broad range of disparate fields that may have never been brought together except through the application sitting on the examiner's desk. But it is also important to realize that when the patent examiner or the patent peer reviewer plays the part of the "person skilled in the art," s/he is also engaging in an act of political representation — albeit an implicit one. S/he is not only playing "the person skilled in the art" on behalf of the taxpayers who don't have those skills, but is also standing in for the millions of people who, independently of their expertise, simply cannot be there then to be consulted on a decision that involves them as direct stakeholders in the "patent bargain" — the contract between the inventor and the public at the roots of modern patent law [37].

If a journal referee is asked to stand not for the author but for thousands possible readers, a patent examiner is paid to think not for the applicant but for almost three hundred million people. The scale of representation does not change the logic of the review (which should remain non-collaborative rather than critical or adversarial) but it certainly raises stakes and risks. Any gesture toward treating the applicant as somebody with whom the examiner should collaborate with reflects a deep misunderstanding of what "review" and "collaboration" means — a categorical mistake with potentially massive costs for the public. 

About the author

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Notes

1. Beth Simone Noveck, "Peer to Patent: Collective Intelligence, Open Review, and Patent Reform," *Harvard Journal of Law & Technology* volume 20 (2006): pp. 123–286, but see also <http://dotank.nyls.edu/communitypatent>. Gowers Review of Intellectual Property, December 2006, pp. 84–85, at http://www.hm-treasury.gov.uk/media/583/91/pbr06_gowers_report_755.pdf (accessed 15 January 2007). The USPTO is planning a pilot program to test the feasibility of the peer-to-patent initiative in 2007.

2. Patents Bill [H.R. 41] 10 March 1790, Sec. 1, reproduced in Edward Waltescheid, *To Promote the Progress of the Useful Arts: American Patent Law and Administration, 1787–1836*. (Littleton, Colo.: Rothman, 1998), pp. 455–456.

3. *Ibid.*, p. 457.

4. "It shall and may be lawful to and for the said Secretary of State, the Secretary for the Department of War, and the Attorney General, or any two of them, if they shall deem the invention of discovery sufficiently useful and important, to cause Letters Patent to be made out in the name of the United States," *Ibid.*, p. 463.

5. *Ibid.*, p. 467.

6. That requirement was weakened down to its present form only in the 1836 Patent Act.

7. Joseph Scott Miller, "Building a Better Bounty: Litigation-Stage Rewards for Defeating Patents," *Berkeley Technology Law Journal*, volume 19 (2004), pp. 667–739.

8. See Rishab Aiyer Ghosh, "Cooking Pot Markets: An Economic Model for the Trade in Free Goods and Services on the Internet" *First Monday*, volume 3 (1998), at http://www.firstmonday.org/issues/issue3_3/ghosh/; Josh Lerner and Jean Tirole, "Some Simple Economics of Open Source", *Journal of Industrial Economics*, volume 50 (2002): pp. 197–233, esp. pp. 212–215; and, Yochai Benkler's "Coase's Penguin, or, Linux and the Nature of the Firm," *Yale Law Journal*, volume 112 (2002), pp. 369–446; Siobhan O'Mahony, "Guarding the Commons: How Community managed Software Projects Protect their Work", *Research Policy*, volume 32 (2003), pp. 1179–1198.
9. Brian Kahin, "Patent Reform for a Digital Economy," White Paper for the Computer & Communications Industry Association, November 2006, pp. 22–23.
10. Beth Simone Noveck, "Peer to Patent: Collective Intelligence, Open review, and Patent Reform," *Harvard Journal of Law & Technology*, volume 20 (2006), pp. 138–151.
11. Waltescheid, *To Promote the Progress of the Useful Arts*, p. 498.
12. The 1790 U.S. Patent Act may have reflected some of these concerns when it required the deposit of full, enabling specifications at the time of the grant, not of the application (*Ibid.*, p. 465).
13. Huygens seemed to think that the editor could be as likely to steal or leak his "secret" as any of his other competitors, and wanted a documented timestamp from the journal before disclosing the text – a process that, given the speed of the post, could take months. On Galileo's distrust of colleagues, printers, and even patrons see Mario Biagioli, *Galileo's Instruments of Credit: Telescopes, Images, Secrecy* (Chicago: University of Chicago Press, 2006), esp. pp. 77–134.
14. Rob Iliffe, "'In the Warehouse': Privacy, Property, and Priority in the Early Royal Society," *History of Science*, volume 30 (1992), pp. 29–62.
15. Alan R. Price, "Cases of Plagiarism Handled by the United States Office of Research Integrity, 1992–2005" *Plagiary*, volume 1 (2006), pp. 1–11. This is unsurprising, as scientific credit is based as much on priority as on content. Getting access to claims before they get published or even researched gives the plagiarist a hugely beneficial head start in trying to establish him/herself as the real author of those claims.
16. Arti Rai, "Open and Collaborative Research: a New Model for Biomedicine," *Duke Law School Research Paper*, number 61, p. 11, at <http://ssrn.com/abstract=574863>, accessed 9 January 2007.
17. Paradoxically, in these cases plagiarism seems to take place where there are no IPRs, and not to take place in contexts involving IPRs.
18. Mario Biagioli, "Rights or Rewards: Changing Contexts and Definitions of Scientific Authorship," *Journal of College and University Law*, volume 27 (2000), pp. 99–103.
19. See for instance the different publication patterns of senior academic scientists and postdoctoral fellows in the AFCS project discussed in Arti Rai, "Open and Collaborative Research: A New Model for Biomedicine," *Duke Law School Research Paper*, number 61, pp. 21–22 and at <http://ssrn.com/abstract=574863>, accessed 9 January 2007.
20. We could say that editors have the ability to confront dishonest reviewers with the unacknowledged "prior art" of their fraudulent publications.
21. Eric Raymond, *The Cathedral and the Bazaar*, "Homesteading the Noosphere," section on "Ownership and Open Source," at <http://www.catb.org/~esr/writings/cathedral-bazaar/homesteading/ar01s04.html> accessed 24 January 2007.
22. "Peer to Patent Project – Use Case Model," 20 October 2006, p. 3.
23. *Ibid.*, pp. 12, 14.
24. The way patent claims and scientific claims are constructed is, however, remarkably different, as analyzed in Greg Myers, "From Discovery to Invention: The Writing and Rewriting of Two Patents," *Social Studies of Science*, volume 25 (1995), pp. 57–105.
25. Markus Reitzig, Joachim Henkel, Christopher Heath, "On Sharks, Trolls, and Other Patent Animals: 'Being Infringed' as a Normatively Induced Innovation Exploitation Strategy," at <http://ssrn.com/abstract=885914>.
26. Only recently has the PTO introduced the so-called "second pair of eyes" to have a second

examiner review applications approved by another examiner. This practice, about which little is known, was launched to review business methods patents, but is expected to be applied more broadly (USPTO, "21st Century Strategic Plan," p. 9).

[27.](#) Brian Kahin, "Patent Reform for a Digital Economy," p. 11.

[28.](#) Beth Noveck, personal communication, 20 January 2007.

[29. <http://www.nature.com/nature/peerreview/debate/nature05535.html>.](http://www.nature.com/nature/peerreview/debate/nature05535.html)

[30.](#) The adoption of that model would be facilitated by the fact that editorial peer review has already been the subject of a remarkable amount of detailed empirical research, down to its problems and biases (cognitive, social, gender, race, etc). The literature is too vast to list, but a starting point are the papers at <http://www.nature.com/nature/peerreview/debate/index.html>, and the many references in Tom Jefferson, *et al.*, "Effects of Editorial Peer Review," *JAMA* (5 June 2002), pp. 2784–2786, especially the proceedings, published in *JAMA* of the various international conferences on peer review.

[31.](#) ICMJE, "Uniform Requirements for Manuscripts Submitted to Biomedical Journals," February 2006 version, at www.icmje.org.

[32.](#) Pierre Bourdieu, "The Specificity of the Scientific Field," *Social Science Information*, volume 14 (1975), pp. 19–47. While less radical than Bourdieu, Robert Merton has also stressed the self-correcting feature of scientific knowledge resulting from mutual criticism among practitioners.

[33.](#) "The primary business of the Patent Business is to help customers get patents," United States Patent and Trademark Office, *FY2001 Corporate Plan*, p. 23 (Section on "Patent Business") at <http://www.uspto.gov/web/offices/com/corpplan/pt04.pdf>. Applicants are routinely referred to as "customers" in the 2001 Corporate Plan. Although I have not found equivalent statements in the USPTO's "21st Century Strategic Plan," or in the "2007–2012 Strategic Plan," when these documents refer to "stakeholders," it is very clearly that they mean the business community, not U.S. citizens in general.

[34.](#) "It sometimes seems as if the FDA views the drug companies, and not the American public, as its primary client," Marcia Angell and Arnold Relman, "Patents, Profits & American Medicine: Conflicts of Interest in the Testing & Marketing of New Drugs," *Daedalus*, volume 131 (2002), number 2, p. 108.

[35.](#) Michael Heller and Rebecca Eisenberg, "Can Patents Deter Innovation? The Anti-Commons in Biomedical Research," *Science*, volume 280, number 5364 (1998), pp. 698–701; John Walsh, Ashish Arora, and Wesley Cohen, "Science and the Law: Working Through the Patent Problem," *Science*, volume 299, number 5609 (2003), p. 1021; Scott Stern and Fiona Murray, "Do Formal Intellectual Property Rights Hinder the Free Flow of Scientific Knowledge? An Empirical Test of the Anti-Commons Hypothesis," *NBER Working Paper*, number W11465 (July 2005), at <http://ssrn.com/abstract=755701>.

[36.](#) The review of book manuscripts for academic presses is only a partial exception to an otherwise fee-free peer review system. The typical reward of 150 or 200 dollars for reviewing a book manuscript is a token gesture, not an actual payment for a couple of days of work. Also, while funding agencies like the NSF compensate the members of grant or fellowship review committees, that does not represent a payment for their work but rather a reimbursement for their travel expenses.

[37.](#) Mario Biagioli, "Patent Republic," *Social Research*, volume 73 (2006), pp. 1129–1172.

Contents Index

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Bringing Peer Review to Patents by Mario Biagioli
First Monday, volume 12, number 6 (June 2007),
URL: http://firstmonday.org/issues/issue12_6/biagioli/index.html