

**ZOOM**

# **Open Source as Prior Art for Computer-implemented Inventions**

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*“If people had understood how patents would be granted when most of today’s ideas were invented, and had taken out patents, the industry would be at a complete standstill today. I feel certain that some large company will patent some obvious thing related to interface, object orientation, algorithm, application extension or other crucial technique.”*

Bill Gates, Internal Microsoft Confidential Memo ‘Challenges and Strategies’,  
16 May 1991

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## Executive Summary

Open source software and hardware repositories are an important source of prior art in the patent examination of computer-implemented inventions. However, incorporating these sources into actual examination practice has been challenging. Over the years, there have been concerted efforts to create a sustainable mechanism for public participation in the examination process by means of peer-review initiatives such as Open Source as Prior Art or Peer to Patent.

Unfortunately, none of them proved successful in the long term. The main challenge was the lack of verifiable timestamping of such prior art, the often incomplete technical documentation of many volunteer projects, and the difficulties in converting these sources into reliable patent information. Defensive publications have an undisputed merit but are also not a sustainable solution in the sense that they rely on the efforts of third parties. Similarly, statutory mechanisms, such as the third-party observations phase in the examination process at the European Patent Office, are of limited help because they can be, by design, only ad hoc sources of prior art.

We urge patent offices and policymakers to take the leadership in expanding existing databases with reliable open source prior art. While this process should be informed by public participation, it should also be spearheaded by the patent offices who have the expertise to curate such databases and ensure the reliability of the patent information. Specifically, we recommend the following measures:

- The efforts to build **prior art databases** should not be left solely to the goodwill of volunteers in peer-review initiatives, useful as they may be. Patent offices have both the institutional capacity and the legal authority to ensure that curated prior art databases are a reliable source of heterogeneous patent information, incl. verified and timestamped open source software and hardware contributions.
- Patent offices should work towards a **global harmonisation of relevant prior art disclosure requirements**, ideally under the auspices of WIPO. Patent applicants should be required to disclose relevant prior art in their applications. This should improve patent quality and show goodwill on the part of applicants to keep their end of the patent bargain.
- Patent offices should engage with and **raise awareness** among open source communities about the possibility to file **third-party observations** in patent examination.

The combined effect of these measures should lead to a patent system that rewards truly novel, high-quality inventions informed by the real state of the art in the fast-paced field of computer technology.

## Open Source and Software Patents

Patents and open source, as two different approaches to innovation, may appear to promote similar goals - namely, fostering transparent innovation through public disclosure. However, a fundamental tension has persisted between these two approaches for as long as they have coexisted.

The crux of this issue lies in the different nature, scope, and degree of exclusive control granted by the underlying intellectual property rights, as well as the innovation models they enable.

Copyright protects the original expression of an idea, e.g., a computer program. For example, copyright protects the specific implementation of a computer program that implements the fast inverse square root algorithm but it does not protect the algorithm and cannot prevent others from implementing it. Independent creation can be used as an excuse for copyright infringement. Open source relies on copyright to reverse the effect of exclusivity and use it as a weapon against those who may want to foreclose the results of open source innovation. In contrast, patents are legal titles that offer a temporary private right to the holder of the invention who can prevent others from using their patented invention. They encompass any embodiment of a patented idea, regardless of form, knowledge of the existence of the invention etc. Independent invention is not a defence against patent infringement.

This fundamental difference between the underlying rights justifies the different nature of the innovation models adopted by inventors and open source communities. Inventors seek exclusive rights, essentially uninterrupted long-term monopolies, as a reward for their inventive, technical contributions to the art. In stark contrast, open source development champions unfettered sharing, collaborative innovation within geographically dispersed and diverse communities, and public scrutiny and improvement of the fruits of this collective effort.

Against the long-term monopoly to exclude everyone else from practising their invention, inventors are compelled to disclose their teachings to the public, but with the caveat that the public cannot practise the patented invention until after the patent term. This *quid pro quo* is the cornerstone of the patent system but it is also the element that has proven most controversial in the debate on so-called software patents.

The debate on whether software should be protected solely by copyright or also by patents has polarised into competing ideological propositions. While open source advocates take issue with the very idea of software patents, patent proponents argue that where an invention is capable of making a technical contribution to the art, it should be granted protection, regardless of whether it is implemented in software or hardware.

Ideological differences notwithstanding, there is a compelling body of evidence which shows that patents have issued for far less than inventive software, including software that may read on publicly available open source code. More generally, improving the (deteriorating) patent quality has taken centre stage among patent offices.<sup>1</sup> There is real evidence that software patents can be bad for society because they unjustifiably foreclose art that should be available to anyone to practise. How can the patent system prevent this from happening?

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<sup>1</sup> <https://copilot.github.com/>

## In Search of the Open Source Prior Art

At first glance, the answer is straightforward: if the claimed inventions are not novel or if they are obvious, then no patents should be granted for such ‘bad’ inventions. The problem is that so-called ‘open source’ prior art is usually nowhere to be found in patent databases that are routinely used in patent examination. This effectively leaves out vast amounts of free and open source software and hardware repositories which may prove critical in destroying the novelty of the claimed invention.

Patent examiners rely on specialised databases to discover prior art. In most cases, these databases comprise issued patents, published patent applications, and scientific publications. However, to date, there is no centralised database of open source software and hardware repositories and accompanying technical documentation that may be consulted by patent offices during examination. Indeed, ‘[w]hile patent examiners have access to some non-patent literature, they do not have the same degree of access to much of the nonpatent prior art literature that exists, such as published articles, software code, and conference presentations’.<sup>2</sup>

The need for an effective and rigorous assessment of inventions which should consider the breadth as well as the depth of prior art is well recognised by industry. For example, in its amicus brief to the G3/08 referral to the Enlarged Board of Appeals at the European Patent Office, IBM argued for ‘a comprehensive search of the state of the art including, in particular, computer programs available in source code form such as open source software’.<sup>3</sup>

Why has building such a database proven so challenging? It was certainly not for want of trying. Over the past few decades, several projects have attempted to build such databases or create new mechanisms to engage open source communities in the examination process. Unfortunately, all of them have failed, been discontinued, or both. The following paragraphs offer an overview of these efforts and the lessons learnt.

## Public Participation and Disclosure of Prior Art in Patent Examination

### Peer-review Initiatives

**Open Source as Prior Art (OSAPA)** was a project spearheaded by the Linux Foundation. This was an initiative to enable open source software repositories to be considered during prior art search. The problem turned out to be technical and is, paradoxically, the result of the heterogeneity of open source communities and the nuances in their approaches to innovation through open source.

<sup>2</sup> Naomi Allen and others, ‘Peer to Patent: First Pilot Final Results’ (Center for Patent Innovations at New York Law School 2012) 4 <<http://www.peertopatent.org/wp-content/uploads/sites/2/2013/11/First-Pilot-Final-Results.pdf>>.

<sup>3</sup> International Business Machines Corporation, ‘Re: Referral of the President of the European Patent Office under Article 112(1) (b) EPC - Brief of Amicus Curiae (International Business Machines Corporation)’ 9 <[https://link.epo.org/web/g3-08\\_amicus\\_curiae\\_brief\\_ibm\\_en.pdf](https://link.epo.org/web/g3-08_amicus_curiae_brief_ibm_en.pdf)> accessed 9 January 2024.

That problem was incomplete documentation and the lack of a verifiable way to prove that a certain piece of code existed at a given date. The project formulated the following primary goals:<sup>4</sup>

- Creating a community of active people who understand and share the motivation behind the project
- Alignment with the existing patent office classification schemes for computers and computer software
- Defining practical use cases (e.g., software developer, software user, or indeed patent examiner use cases) and building a tagging prototype (i.e., building a tagging wizard, an XML RDF container, and breaking tags into system, component and algorithm areas).
- Ensuring source code can be used as prior art, i.e., establishing electronic publication practices (e.g., timestamping) that any software author can use to ensure their source code can be used as prior art.
- Locating relevant electronically published source code, i.e., creating search mechanisms and interfaces to allow patent examiners and others to more easily locate relevant electronically published source code and its related documentation.

The project quickly came to the realisation that software was not published in a way that was amenable to search in a fashion similar to traditional patent information. Indeed, open source projects are not always accompanied by comprehensive technical documentation. Timestamping proved critical - without a verifiable way to timestamp source code, it is virtually impossible to establish if it existed on a given date or not. The lack of rigorous documentation was another challenge that was common to open source projects at the time. The project was eventually discontinued.

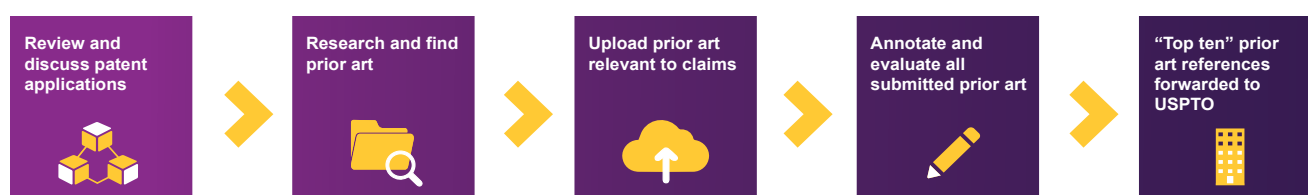
**Peer to Patent** was another project, led by the US Patent and Trademark Office in collaboration with the New York University's Law School. The project aimed to engage the software community in a peer review process to identify, submit, critique others' submissions and rank prior art. In the words of its creators, Peer to Patent was designed as an:

*"[O]nline system that aims to improve the quality of issued patents by enabling the public to supply the USPTO with information relevant to assessing the claims of pending patent applications. This pilot project connects an open network for community input to the legal decision-making process. The community supplies information and research based on its expertise. The patent examiner makes the final determination on the basis of legal standards. This process combines the democracy of open participation with the legitimacy and effectiveness of administrative decision making."*<sup>5</sup>

<sup>4</sup> Linux Foundation, 'OSAPA - Motivations' (2006) <<https://wiki.linuxfoundation.org/osapa/milestones>> accessed 8 January 2024.

<sup>5</sup> United States Patent and Trademark Office and New York University Law School, 'Peer to Patent Project' (Peer to Patent) <<https://www.peertopatent.org/>> accessed 8 January 2024.

Peer to Patent was designed as a web application with interactive features. It sought to 'improve identification of patents of interest to peer reviewers' in a way that 'creates a sense of cohesive group participation and helps the community visualize its own efforts'.<sup>6</sup> The following figure shows how the Peer to Patent system works:<sup>7</sup>



**Step 1:** Review and discuss posted patent applications

**Step 2:** Research and find prior art

**Step 3:** Upload prior art relevant to claims

**Step 4:** Annotate and evaluate all submitted prior art

**Step 5:** Top 10 prior art references forwarded to USPTO

Despite the initial interest expressed by other patent offices<sup>8</sup> and the promising results after the first pilot, Peer to Patent did not scale up and has been inactive since around 2013.

The idea of public participation in patent examination did not yield the results anticipated by its proponents. Recently, there has been renewed interest in automating prior art search using natural language processing, such as PQAI<sup>9</sup> or IP Screener<sup>10</sup>. These tools allow both patent examiners and patent applicants to look up relevant prior art from vast collections of data. However, it is not clear whether these new tools rely solely on structured patent information or whether they take the extra step of including 'non-conventional' prior art sources.

<sup>7</sup> ibid 6.

<sup>8</sup> The UK Intellectual Property Office launched a pilot in 2011.

<sup>9</sup> 'PQAI: Patent Quality Artificial Intelligence' (PQAI) <<https://projectpq.ai/>> accessed 8 January 2024.

<sup>10</sup> 'IP Screener' (IPscreener) <<https://ipscreener.com/>> accessed 8 January 2024.



## First-party Disclosure of Potentially Relevant Prior Art

First-party disclosure of potentially relevant prior art (i.e., by the patent applicant) is an issue with implications for the balance of rights and obligations in the patent system. Requiring applicants to disclose potentially relevant prior art may lead to better patents of higher quality. However, an obligation to disclose potentially relevant prior art may also be burdensome on applicants.

The provision of Art 124 European Patent Convention provides the European Patent Office with the right (but not the obligation) to invite the applicant to provide information on prior art taken into consideration in national or regional patent proceedings and concerning an invention to which the European patent application relates. Additionally, Rule 141 of the EPC Implementing Regulations provides that an applicant claiming priority within the meaning of Article 87 shall file a copy of the results of any search carried out by the authority with which the previous application was filed together with the European patent application, in the case of a Euro-PCT application on entry into the European phase, or without delay after such results have been made available to him.

The issue is recognised as critical among patent practitioners. Indeed, at the 2023 AIPPI World Congress in Istanbul, the Reporter General team introduced as one of the Study Questions selected by AIPPI's Executive Committee for consideration during the 2024 AIPPI World Congress in Hangzhou the question of disclosure of prior art.<sup>11</sup>

Some jurisdictions have introduced requirements for disclosure of prior art. However, these requirements remain globally heterogeneous. This merits further discussion which is beyond the scope of this policy brief but one with significant implications for how patent offices get access to relevant prior art and whether the burden of disclosure should be put on patent applicants acting in good faith.

## Third-party Observations in Patent Examination

Public participation in patent examination is also possible by reliance on statutory rights of third parties to intervene in the examination process and to bring prior art to the attention of patent offices. For example, under Art 93 European Patent Convention, following publication of the European patent application, any person may present observations concerning the patentability of the invention.

The observations phase allows third parties to present observations concerning lack of novelty and/or inventive step, which are the most commonly submitted observations, but also clarity, sufficiency of disclosure, patentability and unallowable amendments.<sup>12</sup> The observations must include a statement of the grounds on which they are based. They become part of the file, including when filed anonymously.

<sup>11</sup> AIPPI, 'About AIPPI – Aims and Purpose' (AIPPI) <<https://www.aippi.org/about-aippi/>> accessed 9 January 2024.

<sup>12</sup> Guidelines for Examination in the European Patent Office 2022, Part E, Chapter VI, 3. Observations by third parties.

One major weakness of the third-party observations system is that submitting observations requires vigilance on the part of third parties with respect to pending patent applications. While this certainly works for individual patents, the system of third-party observations is not really scalable so as to become a source of prior art for all computer-implemented inventions as a matter of principle. Third-party observations are an important element of furnishing evidence of prior art to patent offices and the latter should raise awareness about it among open source communities. However, this mechanism is not a sustainable solution to the problem of identifying and providing open source software and hardware prior art in the examination process.

## Defensive Publications

Finally, there is the possibility of relying on defensive publications as a mechanism to establish prior art to prevent others from later attempting to patent either the same or similar technology<sup>13</sup>. This is industry practice followed by companies such as IBM and Google. Three particular initiatives stand out - Linux Defenders, Technical Disclosure Commons, and Software Heritage.

**Linux Defenders** is an initiative of the Open Invention Network (OIN). It is described as a 'manifestation of the commitment that OIN has made to protect its community and core Open Source Software from patent aggression. It is an umbrella concept encompassing the many ways that OIN and its partners are working to eliminate low-quality patents, which are frequently leveraged by strategic patent aggressors and patent trolls'.<sup>14</sup> Linux Defenders supports the community members of the OIN by providing prior art assistance. Specifically, this support includes leveraging the network of relationships to identify and share prior art for use against non-practising entities or corporate patent aggressors, and advocating open source use of defensive publications by publishing them for free at Technical Disclosure Commons.<sup>15</sup>

**Technical Disclosure Commons** is a 'collection of technical disclosures from various companies and individuals (...) [whose purpose is to prevent] subsequent patenting of those ideas'.<sup>16</sup> Its sole objective is to boost patent quality by pooling prior art that should prevent the issuance of broad or obvious patents.

Finally, **Software Heritage** is an important organisation that has built an archive of more than 6 billion unique source files. The archiving of code in a curated format helps maintain the technical and scientific knowledge that goes with the code, preserves innovation, and aids in the determination of prior art.<sup>17</sup>

<sup>13</sup> Malcolm Bain and P McCoy Smith, 'Patents and the Defensive Response' in Amanda Brock (ed), *Open Source Law, Policy and Practice* (2nd edn, Oxford University Press Oxford 2022) 244 <<https://academic.oup.com/book/44727/>>

<sup>14</sup> oin-admin, 'Linux Defenders' (Open Invention Network) <<https://openinventionnetwork.com/community-initiatives/linux-defenders/>> accessed 8 January 2024.

<sup>15</sup> *ibid.*

<sup>16</sup> 'Technical Disclosure Commons' <<https://www.tdcommons.org/>> accessed 8 January 2024.

<sup>17</sup> 'Software Heritage' <<https://www.softwareheritage.org/2020/02/04/open-invention-network-2/>> accessed 9 January 2024.

## Policy Recommendations

In a recent study commissioned by the European Commission on the impact of open source software and hardware on technological independence, competitiveness and innovation in the EU economy, the authors explicitly pointed out the absence in the European Patent Convention of any 'reference to software or even OSS as sources of prior art, although the interface between patents and software in general and OSS in particular is going to become more relevant with the further digitalisation of technology and industry.'<sup>18</sup>

One of their recommendations focused on introducing 'a provision (...) requiring that reference implementing code set out in a patent must be released under an appropriate open source licence (consistent with the fundamental bargain underlying the patent system) that the patent holder receives a limited monopoly in exchange for opening the implementation to the world, to facilitate understanding, research and study.'<sup>19</sup>

## Disclosure of Source Code Is Not Required and Should Not Be Required

This recommendation is noble and would have the practical effect of generating prior art in the form of open source software from each granted patent and patent application which concerns a computer-implemented invention. However, the problem with this proposal is that it assumes that every computer-implemented invention would have reference implementing code. This is certainly not the case and, indeed, there is a good reason why reference implementing code is not part of the sufficiency of disclosure requirement.

There is no legal basis in the European Patent Convention to require applicants to furnish the source code that implements their disclosed technical teaching. The EPO does not consider it necessary to ask patent applicants to provide source code for sufficient disclosure,<sup>20</sup> nor to require actual reduction to practice for software-related inventions. Furthermore, introducing a requirement to release reference implementing code under an open source licence raises additional questions. Should the release be made in pseudocode or in a specific programming language? What if the implementation depends on modules or libraries that are not required for sufficiency of disclosure, but which may be necessary to understand the reference implementing code? Should everything be disclosed?

A sufficient disclosure of the technical teaching should enable the person skilled in art to carry out an implementation of the invention in a programming language and framework and on a platform of their choice. The person skilled in the art should not need the implementing code as a matter of principle, lest the disclosure would be insufficient.

<sup>18</sup> Blind, Knut and others, 'The Impact of Open Source Software and Hardware on Technological Independence, Competitiveness and Innovation in the EU Economy' (Publications Office of the European Union 2021) Final Study Report 335 <<https://ec.europa.eu/newsroom/dae/redirection/document/79021>>.

<sup>19</sup> *ibid.*

<sup>20</sup> European Patent Office, 'Patents for Software? European Law and Practice' (European Patent Office 2009) 12.

The idea of open source prior art disclosure is not to include the vast repositories of open source code in patent databases, or to force patent applicants to disclose the source code of embodiments of their inventions. The purpose is to create a reliable source of implementations that clearly practise subject matter that belongs in the prior art but that patent applicants acting in bad faith may try to foreclose.

## **Public Participation in patent examination and disclosure of prior art should be prioritised under the aegis of patent offices**

Instead of introducing new subject matter-specific requirements to patent law, we suggest that patent offices should prioritise public participation and disclosure of prior art in patent examination.

Specifically, we urge patent offices to leverage the available statutory means to require patent applicants to disclose relevant prior art. Such prior art, whether in the form of implementing source code, technical documentation, or scientific publications, should be systematically categorised and made available in databases maintained by the patent offices.

The efforts to build prior art databases should not be left solely to the goodwill of volunteers in peer-review initiatives, useful as they may be. Patent offices have both the institutional capacity and the legal authority to ensure that curated prior art databases are a reliable source of heterogeneous patent information, incl. verified and timestamped open source software and hardware contributions.

Furthermore, patent offices should work towards a global harmonisation of relevant prior art disclosure requirements, ideally on a multilateral basis within WIPO. Finally, the EPO and other patent offices should engage with and raise awareness among open source communities about the possibility to file third-party observations in patent examination.

The combined effect of these measures should lead to a patent system that rewards truly novel, high-quality inventions informed by the real state of the art in the fast-paced field of computer technology.

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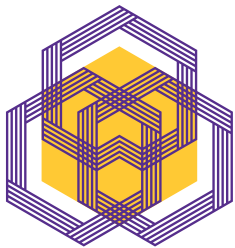
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