# Motives for Patent Pledges: A Qualitative Study

Jonas Fabian Ehrnsperger (CTM, University of Cambridge) *
Frank Tietze (CTM, University of Cambridge)


* Please contact the corresponding author for feedback:
jfe27@cam.ac.uk

UNIVERSITY OF CAMBRIDGE

IfM | Centre for Technology Management

# Motives for Patent Pledges: A Qualitative Study

Jonas Fabian Ehrnsperger (CTM, University of Cambridge) *
Frank Tietze (CTM, University of Cambridge)


*Please contact the corresponding author for feedback:
jfe27@cam.ac.uk

Abstract

Patent Pledges are initiatives of patent owners in which they announce the free or reasonable availability of active patents. Many firms struggle to understand the rationales behind these strategies, making it difficult to decide whether or not to trust them. After all, respective patent owners could also let the patents lapse to make them available. So, what do patent owners hope to achieve through these initiatives? Existing literature suggests motives for patent pledges, but lacks academic rigor and empirical evidence. To further our understanding of patent pledges, we conducted 30 expert interviews, including people directly involved in the decision to initiate and to execute patent pledges. As a complementary data source, we qualitatively analysed 50 public patent pledge statements with respect to their underlying motives. We found 13 distinct motives belonging to three general categories, the primary motive being 'Driving Technology Diffusion'. We contribute to existing knowledge by providing novel insights into the phenomenon of patent pledges and empirical evidence to what the literature has suggested. We argue that all motives of free patent pledges link to the overarching goal of fostering technology diffusion.

Keywords: intellectual property, patent, pledge, motives,

# Introduction

Over the past decades, firms have increasingly engaged in sharing their patent rights with other organisations. This has often been labelled a *patent pledge* which is defined as *'a publicly announced intervention by patent owning entities ('pledgers') to out-license active patents to the restricted or unrestricted public free from or bound to certain conditions for a reasonable or no monetary compensation using standardized written or social contracts'* \cite{Ehrnsperger2019a}. Examples include Tesla Motors, Toyota, and Ford who announced that their active patents relating to alternative powertrains can be used for free (Tesla and Toyota) or for a reasonable fee (Ford). Furthermore, Microsoft, IBM, and Google applied multiple patent pledges in the area of information- and communication technology (ICT). To some extent these strategies seem to contradict the original purpose of patents as exclusionary rights. As it stands, several firms seem to be puzzled  by patent pledges, their purpose, validity, and 'honesty'. They do not know how to react to these strategies and might even feel a certain distrust. In other words, they wonder: what motivates organisations and the relevant decision makers to share their patents?

In an attempt to answer this question, some scholars across different disciplines have already attempted to address this issue, albeit existing research remains scarce and incomplete. Several studies investigate the motivations of revealing information in the context of so-called '*collective inventions*' and the motivations behind open source software and open innovation (see for instance \cite{Schweisfurth2011} for an overview of motives for different models). However, only a few colleagues focus on patent rights specifically \cite{contreras2017patent, Ziegler2014}. While these studies deliver first very helpful insights, they derive their results from unsupported assumptions, logical reasoning, and limited empirical enquiry.

This paper addresses that problem by providing empirical evidence from qualitatively analysing 30 semi-structured interviews and secondary data from 50 patent pledges. The interviews have been conducted specifically in the context of the motivation behind patent pledges, whereas 15 interviewees work or have worked in an organisation that applies or has applied at least one patent pledge in the past. Interviewees include heads of Intellectual Property (IP) departments of global organisations, patent attorneys, a former president of the US patent office, CEO's of small- and medium-sized enterprises (SME's), and IP consultants. The data for the 50 patent pledges constitute publicly available statements of patent owners, in which they announce the broad availability of their patents. Through qualitative coding, we provide an empirical study that includes insights from experts that were directly involved in patent pledges. The coding process consists of two cycles of which the resulting categories have been validated using a blind

comparison of an independent researcher. We aim to supplement existing knowledge through the exchange with renowned IP experts, as well as through the analysis of secondary data.

The paper is structured as follows: [To be added]

## Theoretical background

Previous studies have shown that the notion of *patent pledges* lacks a consistent definition and that the disregard of different types leads to contradictory results \cite{Ehrnsperger2019a}. Similarly, the motives for these pledges lack a coherent classification. Often, the underlying rationale is mentioned in the context of sharing mechanisms other than patent pledges, which leads to contorted and blended results. Few attempts have been made to provide a comprehensive, broadly applicable taxonomy, and these few ask for further affirmation. Subsequent, we provide an overview of relevant studies that investigate these motives. However, we do not aim to provide a review relating to motives in all areas of open innovation and open-source software. Rather, we focus on motives that have been investigated in the context of patents, specifically patent pledges. For an overview of general motives in the areas of collective inventions, user innovation networks, commons-based peer production, crowdsourcing, and open-source innovation, we refer to \cite{Schweisfurth2011}.

The reason why many firms struggle to understand the phenomenon of patent pledges is because they focus on the *private investment model*, which assumes that private returns can be appropriated from innovation \cite{Demsetz1967, Hippel2003}. Patents as one form of IP act as an enabler for the private investment model, because they grant the inventor a temporary, exclusive right to appropriate direct returns on his investment \cite{Arrow1962}. In this model, any free disclosure of information will reduce the inventor's profit and should therefore be avoided \cite{Hippel2003}. In contrast, the *collective action model* refers to the creation of innovation that requires the inventor to relinquish exclusionary rights and to make his invention available to the public \cite{Olson1971}. Unsurprisingly, the collective action model faces the problem to motivate firms and individuals to innovate, because their possibilities to appropriate a direct return for their investment are limited \cite{Hippel2003}. Nevertheless, some authors observe that innovators do benefit from sharing their know-how, at times even to a higher degree than from the traditional private investment model.

In his seminal paper, Allen (1983) investigates the free exchange of information in the English iron and steel industry of the 19th century, a phenomenon that he calls *collective invention* \cite{Allen1983}. He observed the recurrent behaviour that technical information was exploited by entities other than the firm who discovered it. However, Allen notes that this specific industry was characterised by non-appropriability, because many inventions were not patentable. He mentions increased output, difficulties to keep the information secret, and increased profits as possible rationales for firms to apply these strategies.

When looking at Allen's study on collective invention, one could easily disregard its applicability to patented inventions. Surprisingly, many modern studies find similar motives in industries that are saturated with patent rights. In doing so, they all share, at least to some extent, Chesbrough's stance that a patent owner can profit from other's use of his IP \cite{Chesbrough2003}. Some authors argue the the short-term reward through licensing-revenues is simply too myopic \cite{Alexy2009,Teece2018}. Following, we briefly summarise related studies.

West and Gallagher (2006), while investigating open innovation in the context of open-source software, mention that IP might be given away to stimulate demand for related products \cite{West2006}. Similarly, Barnett (2011) describes what he calls *voluntary forfeiture actions*, and states that they occur primarily in platform markets that exhibit network effects \cite{Burnett2011}. The motive is to induce platform adoption, whereat the firms 'generosity' of forfeiting ownership or control rights follows from economic self-interest \cite{Burnett2011}. Alexy, Criscuolo and Salter (2013) describe what they call *selective revealing strategies* \cite{Alexy2013}. In their study, innovators reveal knowledge either to create a new or to extend an existing (technological) path favoured by the focal firm. Hence, the authors argue that increased compatibility and higher adoption rates of the revealed technology motivate innovators to selectively reveal knowledge. This motive of increased technology adoption is also supported by Chien (2016), this time, however, specifically in the context of 'patent waivers' \cite{Chien2016}. The author also mentions PR and public concerns as drivers to conduct patent pledges. Rimmer (2018) again mentions increased platform adoption as a motive of patent pledges, this time specifically in the context of electric and fuel-cell vehicles and clean energy \cite{Rimmer2018}. The idea of increased technology diffusion through patent pledges relating to sustainable technologies is also taken up by Contreras, Hall, and Helmers (2018). They assess the success of the Eco-Patent commons, a non-profit initiative by large firms with the goal to pledge 'green' patents, and find that this specific pledge did not increase technology diffusion \cite{Contreras2018}.

This brief overview of studies shows, that the main motive of patent pledges, as mentioned in the literature, is to increase technology diffusion. Below we describe two other studies in more detail, Contreras and Jacobs (2017) and Ziegler, Gassmann and Friesike (2014) \cite{contreras2017patent, Ziegler2014}. We focus on thesm because they provide, to our knowledge, the only frameworks for motives specifically in the context of patent pledges. Both distinguish between four general rationales. Importantly, from a methodological perspective, it is not clear how the authors arrive at their taxonomies.

Ziegler, Gassmann and Friesike (2014) propose a typology consisting of four different motives behind what they call *patent releases*, whereas they only consider patents that can be accessed without any monetary compensation \cite{Ziegler2014}. The authors distinguish motives according to their importance and the financial or non-financial motives of the patent owner. As mentioned above, increased technology diffusion is part of the author's *profit making motive*, because firms try to achieve a dominant market position. Furthermore, better PR and serving the society are also mentioned as motives by the authors. Importantly, the study includes patent donations, which we conceptualize as distinctively different from patent pledges \cite{Ehrnsperger2019a}. Furthermore, the authors did not have access to patent managers directly involved in the free sharing of patents, which is why they relied on secondary sources \cite{Ziegler2014}.

While Ziegler, Gassmann and Friesike (2014) focus on *patent releases* that can be accessed without any monetary compensation, Contreras and Jacobs (2017) widen their definition of patent pledges by including the broad access to patents on reasonable fees into their analysis. Furthermore, they do not consider patent donations. Based on their extensive collection of about 178 secondary data from organisations in multiple industries, Contreras and Jacobs (2017) provide (amongst the very few) the most detailed available framework for rationales behind patent pledges to date, \cite{contreras2017patent}. The authors distinguish four motives for firms to adopt patent pledges: 'Inducement', 'Collective Action', 'Voluntary Restraint' and 'Philanthropy' while noting that these motives are not exclusive and can complement each other.

Inducement refers to the goal of a firm to induce other market participants to adopt a technology favoured by the pledger. This is, according to Contreras and Jacob, the most common motive of a patent pledge and supports the studies cited above. According to the authors, the Inducement motive can appear in three forms, depending on the subject the company wants to circulate: 'Interoperability', 'Platform leadership' and 'Market development'. While interoperability aims to convince third parties to invest in a particular standard, platform leadership relates to a favoured

platform or 'de facto standard' of the pledger. With market development, on the contrary, the patent owner tries to induce the adoption of a broad technology area rather than specific standards or platforms.

The Collective Action motives builds on the assumption that a certain activity would be beneficial for all participating parties, but only if enough parties participate. Therefore, firms hesitate to take action, because they are unwilling to invest without knowing if others will do the same. Barnett (2011) described this phenomenon earlier as 'The Intertemporal Dilemma' \cite{Burnett2011}. Contreras and Jacob (2017) state that Collective Action often occurs in an environmental context and refer to the Eco-Patent Commons as an example of a patent pledge in this category. According to the authors, a collective action induced patent pledge can help to reduce the hesitation of companies to participate \cite{contreras2017patent,Wen2016a,Alexy2013a}.

Voluntary Restraint, on the contrary, relates to a firm's commitment not to enforce or exploit specific patents in a predetermined manner. This sort of patent pledge aims to appease governmental bodies or courts in a way that is beneficial for the pledger, for example in the process of the approval of a company acquisition.

Finally, Contreras and Jacob argue that some patent pledges seem to serve society rather than the company, which the authors allocate to the general Philanthropy motive. Chien (2016) supports this assumption by stating that sharing Intellectual Property rights (IPRs) can have humanitarian reasons \cite{Chien2016}. However, the authors note that only a few pledges are truly philanthropic and that pledgers try to gain benefits through positive public relations (PR) or a stimulated market \cite{Fuller2010,Alexy2018,Schreier2012,raymond2001cathedral,Lerner2002}. Nevertheless, Contreras, Hall and Helmers (2018) conclude that PR seldom serves as the main motivation behind patent pledges\cite{Contreras2018}. Contreras and Jacobs (2017) provide a comprehensive taxonomy of motives for patent pledges that seems reasonable and exhaustive. However, the authors use logical reasoning to derive their results. It is desirable to conduct studies using primary data to amend their taxonomy.

To conclude, existing taxonomies for rationales behind patent pledges seem conclusive, yet they lack academic rigour. These existing studies rely on secondary data or on insights from people that were not involved in crafting and executing patent pledges.

# Methodology

### Research Design

We use case study research and utilise two main sources of data: interviews with IP experts and patent pledges released by firms and organisations. The justification for the decision of case study research is threefold: first, this research is exploratory in nature and aims to answer the why-question 'Why do firms conduct patent pledges'? By further taking into account that patent pledges are a contemporary phenomenon and that no controlled observation that uses manipulation is involved, case study research remains as the only appropriate method \cite{Yin2009,Benbasat1987,Dube2003}. Also, we have the ability to utilisie more than one source of evidence, which is an advantage compared to conventional historical studies \cite{Yin2009,Dube2003}. Second, we argue that previous studies have not satisfactory answered the research question, and therefore aim for theory building rather than theory testing \cite{Eisenhardt2007,Goffin2019}. While prior works mention motives for patent pledges, most of them do so in an unstructured and non-exhaustive way. The few studies that build taxonomies for motives rely on secondary data only or on people who have not been involved in a patent pledge. It is for this reason that we approach this research question from a clean slate \cite{Dube2003,Eisenhardt1989}. Third, case study research, specifically qualitative interviews, are widely used to investigate motives in a managerial context (e.g. \cite{Belal2007,Bansal2000}).

### Data Collection

We collected two types of data: primary data through semi-structured interviews and secondary data that are publicly available.
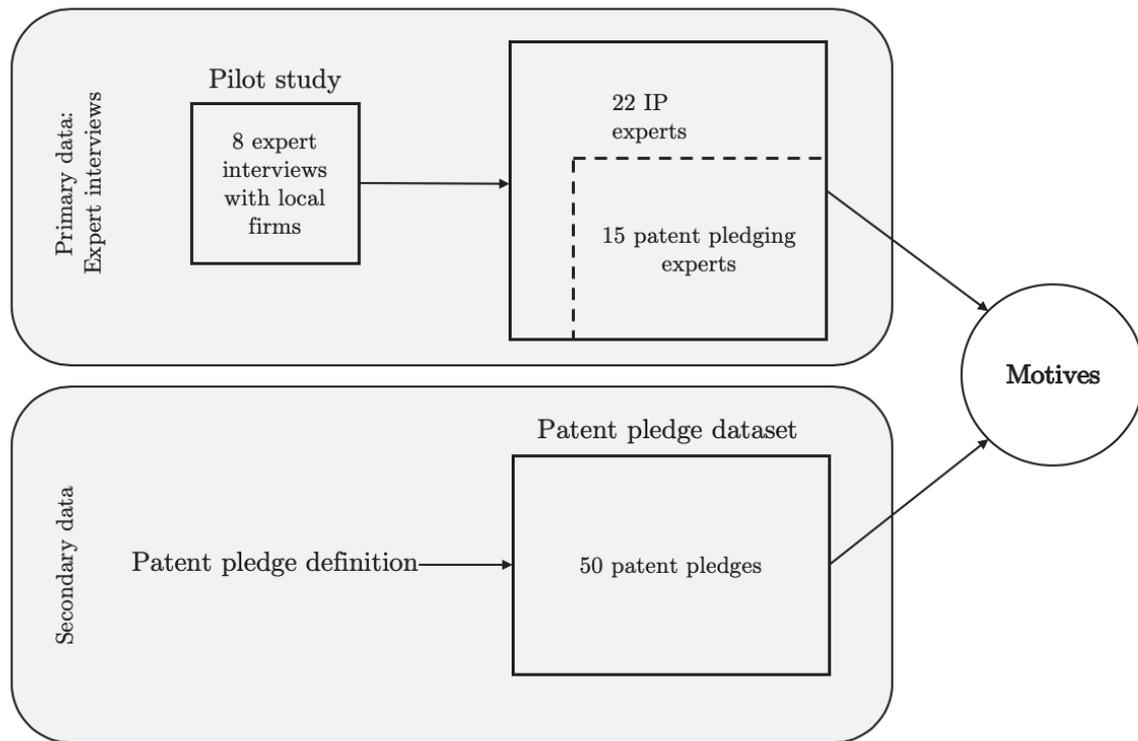
*Figure 1: Research design*

We conducted a pilot study by interviewing eight CEO's, founders, and other top-level managers of eight local SME's in and around Cambridge, UK. The decision to conduct a pilot study stems from two reasons: first, standard literature for case study research suggests pilot studies in highly exploratory research \cite{Yin2009,Dube2003}. Second, at the beginning of our study, we did not know if interviewees that are not IP experts would deliver useful insights into the motives for patent pledges. We therefore specifically targeted top-level managers that (we assume) must deal with patents from time to time, but are not trained to do so. In doing so, we follow Yin (2009) in targeting geographically convenient cases that are unrelated to the cases for the main study \cite{Yin2009,Dube2003}. Depending on the outcome of the pilot study, we would then sample cases for our main study. Due to the non-IP-expertise of the pilot cases, we chose a broader, more general scope of questions than for the main cases \cite{Yin2009,Zinatelli1996}. The pilot study delivered two insights that were of importance for the further proceedings: first, the pilot cases were familiar with the topic of patent pledges, yet they were unanimously hesitant of these strategies. Two out of the eight participants presumed that they might apply similar strategies for the academic community or for reasons of sustainability in the future. However, as SME's, they do not have the resources to do so at the time of the study.

Second, the pilot cases gave some insights into motives behind patent pledges in general, but these were all assumptions. Therefore, since our aim with this paper is to overcome assumptions in this field, we decided to change the theoretical sampling for the remaining study.

We used the insights from the pilot study to refine our sampling methods. Specifically, we limited our sample to renowned IP experts that we chose ourselves and did not apply any geographical restriction. This procedure is known as theoretical sampling and is the suggested sampling method for case studies \cite{Glaser1967,Eisenhardt1989,Goffin2019}. We primarily chose IP experts that currently work or have worked for an organsiation that has applied at least one patent pledge in the past, or currently does so, because they constitute the units of interest that we are particularly interested in. We refer to these highly specialised cases as 'pledging interviewees'. To minimise the risk of biased results, we further include non-pledging experts in our sample, that is IP experts that have not worked in organisations that apply patent pledges. We define IP experts as individuals holding a university degree, being responsible for patent matters in an organisation, and, according to their own claim, knowing the subject of patent pledges in theory. In total, we conducted 22 one-to-one semi-structured interviews with experts from 16 distinct organisations. 15 of those 22 are pledging interviewees from 10 distinct pledging organisations, as defined by \cite{Ehrnsperger2019a}.

Regarding the process of getting access to our cases, we applied two types of sampling methods: expert sampling and snowball sampling. First, we used expert sampling as a form of non-probability sampling because the area of patent pledges requires insights from highly specialised individuals \cite{Daniel2012}. We selected pledging interviewees by directly contacting organsiations from the patent pledge dataset provided by \cite{Ehrnsperger2019a}.
We also apply snowball-sampling \cite{Biernacki1981}, because IP is often perceived as a sensitive issue within an organisation and the matter of patent pledges requires input from insiders. The technique of snowball-sampling, which describes the referral of further contacts through a participant, helped us overcome, at least to a small degree, the problem of gaining access to qualified people. Six out of the 22 interviewees were referred to us through other participants, three of the six were pledging interviewees.

Through these sampling methods, we gained access to senior IP experts, including presidents of IP departments of global firms, a CEO of a large community that aims to foster patent pledges, and a former president of a major patent office. All interviews lasted between 25 and 70 minutes and have been conducted via phone (14), video conference software (5), social-media exchange (2), and in person (1) between September 2017 and June 2019. Five interviews were held in the

German language, the rest in English. We recorded and transcribed the interviews in cases where the participants agreed for us to do so (in 11 cases) and we took notes in cases where they did not (in 11 cases). Since the unit of interest is small and responses could be easily linked to certain organisations or individuals, we anonymise the interviews and censor parts of the quotes in this paper.

For the secondary data, we used the collection of patent pledges of a prior study \cite{Ehrnsperger2019a}. In total, we analysed 50 patent pledge statements and license agreements, each consisting of approximately 1 to 15 DIN A4 files.

### Data analysis

Our choice of theoretical sampling according to \cite{Glaser1967,Eisenhardt2007} involves an argumentative generalisation during the process of data collection \cite{Mayring2007}. In particular, the gathered material is analysed by coding in the sense of inductive theory development \cite{Mayring2007}. In contrast to deductive categorisation, we did not a priori define categories for the codes, but used our research question as a guide \cite{Mayring2000}. We applied qualitative coding for both, the primary data resulting from the interviews and the secondary data from the patent pledge dataset. This is an established method for qualitative motive studies. For instance, Bansal and Roth (2000) used qualitaitve coding for in-depth interviews, participant observation, and archival documents to examine the motives why companies 'go green' \cite{Bansal2000}. To support the analysis, we used NVivo 12 software, which is a commonly used software for qualitative coding in innovation research (see e.g. \cite{Langner2015}). The software facilitated the coding process and allowed for an advanced comparison between data from different organisations and industries. We conducted two coding cycles following the approach suggested by \cite{Saldana2009}. For the first coding cycle, we used structural coding, since all elements in both our data sets are relatively standardised \cite{Saldana2009}. After this first coding cycle, we found that some of our codes were almost indistinguishable. For instance, '*driving technology diffusion*' and '*driving ecosystem industry growth*' were initially two distinct categories resulting from the first coding cycle. Therfore, we applied a second coding cycle, specifically pattern coding, to develop a smaller and more delimitable list of categories \cite{Saldana2009,Mayring2000,Goffin2011}.

There has been much criticism about the reliability in qualtiative coding, because methods that enhance reliability are often overlooked \cite{Fahy2001,Campbell2013}. In particular the problem of discriminant capability due to a lack of exclusiveness amongst categories constitutes a major obstacle that needs to be adressed by more studies \cite{Fahy2001}. To minimise

discriminant capability, we outsourced the review and validation to a second independent postdoctoral researcher with IP expertise, who was not involved in this study \cite{Goffin2019}. The second author of this paper compared both categorisations and found no significant deviations in neither the concepts nor the terminologies. To clarify this, we provide an example for the aggregation of codes into a category:

The first researcher held the view that the following codes from four interviewees should be allocated to one category, which he called '*Improving and fostering technology and innovation*'. '*It encouraged people to develop [...] that read on the functionality of the patents that [...] pledged.*';'*They really believe that more [...] drives innovation faster than really insular technology*'; '*The idea was that if he open-sourced the patent portfolio, this allows other players to engage and push the industry forward.*'; '*Different motive: Fostering technology*' (this last quote is a direct translation from German notes)*.* The second researcher independently allocated the codes to one category, too, which she called '*Fostering innovation and subsequent development*'. As a final authority, the second author compared both results and a decision about the final wording was made.

To derive results, we counted the occurrence of codes belonging to individual categories in both datasets (see appendix). In the past, there has been much debate and criticism about the use of numbers in qualitative research \cite{Maxwell2010}. We are aware of these discussions and emphasise that the frequency of codes should not be used as a conclusive measure of importance. Rather, the numbers indicate the course and the focus of the interviews. Furthermore, since the interviews varied in lengths, the mere consideration of absolute numbers would be misleading. However, we used numbers of distinct categories to support internal generalisability and diversity, as described by \cite{Maxwell2010}. To make our results more credible, we indicate especially important categories for individual interviewees. This approach is known as latent content analysis, which generally refers to the process of interpreting content \cite{Hsieh2005,Holsti1969}. Specifically, we used the language of the respondents and our own subjective judgement to determine this importance. For instance, if an interviewee responded with '*this could/might be because...*' in a coded phrase, we would not consider this as particularly important, because the respondent made a presumption. This stays in contrast to '*we did this because...*', which we would classify as strong evidence.

Since the patent pledges are public statements that have been officially released by the respective organisation, we assume that every mentioned motive can be considered reliable. Therefore, to eliminate speculation from our side, we do not provide indicators for which organisation might show strong evidence for any given motive and count the categories and patent pledge statements

only. Furthermore, if more than one patent pledge is announced in the same statement, we do not distinguish between these pledges, because the allocation of motives to distinct pledges would be speculative. However, because the patent pledges have been officially released by organisations and are unlikely to disclose content that could harm the respective organisation, we focus our analysis on the anonymised interviews and use the patent pledge statements as supporting/opposing data.

## Results

Fig. 2 shows lists all 15single motives that we derived fromcoded in both, the interviews and the patent pledge statements. According to the coding procedure described above We allocate these motives cluster into four general categories:, namely (i) two altruistic motives, (ii) seven managerial motives, (iii) four perceptional motives, and (iv) two technological motives.
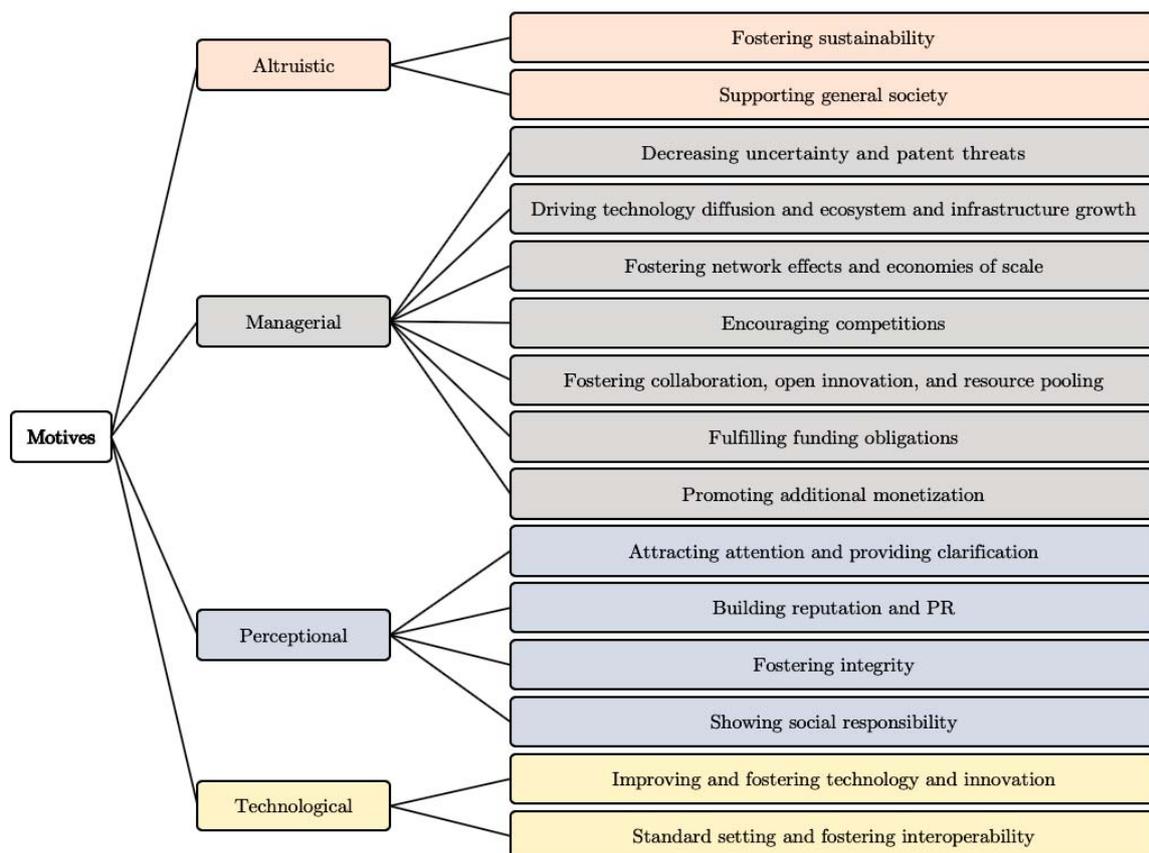


*Figure 2: Motives of Patent Pledges*

The motives arising from analysing the secondary datapatent pledges compared to the motives mentioned by thein the interviewees are, without considering the number of occurrences, generally speaking consistent. We put together all motives from both data streams to draw Fig. 1. However, not all motives arise from both data streams. Specifically, we did not find evidence for the motives '*Encouraging competition*', '*Showing social responsibility*', and '*Fostering integrity*' in the interviews. Analogously, we did not find evidence for '*Fulfilling funding obligations*' and '*Building reputation and PR*' in the patent pledge statements.

In single cases, we find that the number of interviewees that show strong evidence for a specific motive and motives mentioned in the patent pledges differ significantly. The most extreme variance can be observed in the reputational motive '*Building reputation and PR*'. 58% of the pledging interviewees show strong evidence for this motive (38% when considering all interviewees). In contrast, none of the patent pledge statements mentions this specific motive. For a full comparison between the two data streams, we refer to the tables X and Y in the appendix.

Table 1 below provides examples for the four most prominent motives according to the pledging interviewees with supporting quotes from the patent pledges.

| Motives | O. | Selected interview quotes | Selected patent pledge statement quotes |
|---|---|---|---|
| Driving technology diffusion and ecosystem and infrastructure building | ~92 % | *'The problem with electric vehicles and the fuel cell is another good example until you have the infrastructure build up, nobody is gonna make money selling those vehicles. Because nobody is gonna buy them. When you enforce your patents, what you are gonna do is hurt yourself by eliminating the market penetration for that particular type of product.'*<br><br>*'View the world as a pie and I want to take the biggest slice. But if the whole world grows, your slice becomes bigger, too.'*<br><br>*'We are in a very competitive marketplace where we have a [...] and we are competing against [...]. We want when customers are thinking about which one to choose, we have this additional benefit. We want customers to put value on that and we want to let them know that, when they choose our platform, they are gonna get this benefit from it.'*<br><br>*'It has to do with adoption of your technologies and your programs and surveys that show favorability of customers.'*<br><br>*'We wanted to disseminate [...] technology.'*<br><br>*'... in the world of [...], you want to encourage the industry to grow in tandem together.'* | *'Our goal at Blockstream is to accelerate technological innovation in Bitcoin, building infrastructure and innovative tools to support its secure, trustless, decentralized nature. We believe that open innovation is necessary for the long-term success of Bitcoin, and because of this we intend for all of the technology developed at Blockstream to be freely available for the benefit of the Bitcoin community and the world. But we operate in an environment where good intentions are not enough, and must be backed by mechanisms that ensure those intentions are carried out.'*<br>Source: Blockstream Patent Pledge (2017)<br><br>*'By sharing our research with other companies, we will accelerate the growth of electrified vehicle technology and deliver even better products to customers.'*<br>Source: Ford Patent Pledge (2015)<br><br>*'IBM wants to encourage broad adoption of the Covered Specifications....'*<br>Source: IBM (13.07.2007)<br><br>*'Tesla was created to accelerate the advent of sustainable transport, and this policy is intended to encourage the advancement of a common, rapidly evolving platform for electric...'*<br>Source: Tesla Motors'patent pledge (2014) |

| | | | |
|---|---|---|---|
| | | *'Encourage other [...] companies to enter [...] space.'*<br><br>*'The situation [...] drives [...] to open patents. [...] need new infrastructures, so we`d like to motivate them.'* | *'As part of the efforts to popularise FCVs, Toyota Motor Corporation is allowing royalty-free se of about 5,680 of the FCVrelated patent licences [...]. To facilitate faster expansion of hydrogen station networks, Toyota will also provide royalty-free use of approximately 70 hydrogen station-related patent licences indefinitely for those installing and operating hydrogen stations.'*<br>Source: Toyota patent pledge (2015) |
| Building reputation and PR | ~58 % | *'The optics that it looks good when you say 'You can use our patents for free'. When you end up in patent litigation with them, they can also wave this pledge in front of the jury and say 'But we said they can use our patents for free, and they are being really mean by trying to sue us'. It is about making other people look bad. '*<br><br>*'And so [...] has been out there frankly being very much like 'Oh you know, maybe people should be thinking about me like Ghandi. I give away IP and I am a wonderful guy.''*<br><br>*'... move to position yourself as a white knight and being anti-patent and being free innovation and all that. But doing it at a time where he is not actually giving up that much.'* | N/A |

| | | | |
|---|---|---|---|
| | | | |
| Decreasing uncertainty and patent threats | ~50 % | '... if you stumble upon one of Tesla's patents as your operating, it creates the ability to eliminate the fear of infringement. Because you have that free license.'<br><br>'... we knew that we would not get in any legal fight with any of the competitors ....'<br><br>'You are trying to send messages in addition to reconciling actual or perceived issues. You take tension out in places where tension is perceived. Whether you believe there is tension, if others believe there is, you have to deal with that.' | 'The OPN Pledge is designed to supplement existing OSS licensing alternatives, providing patent holders who care about reducing threats to OSS a more robust defensive capability against incoming patent aggression.'<br>Source: Google Open Patent Non-Assertion pledge (2013)<br><br>'We will actively monitor for patent-related threats to Linux and adjacent open source technologies and encourage open source community intellectual property-related initiatives.'<br>Source: Open Invention Network (2019) |
| Supporting general society | ~42% | 'We are trying to share the benefits of the portfolio we have built up over a long period of time.'<br><br>'It was not really to support any one company or a group of companies, the members did this really for the benefits of the entire community. Not because they wanted to get some benefits uniquely themselves.' | '... thereby benefiting Tesla, other companies making electric vehicles, and the world.'<br>Source: Tesla Motors' patent pledge (2014)<br><br>'We believe that open innovation is necessary for the long-term success of Bitcoin, and because of this we intend for all of the technology developed at Blockstream to be freely available for the benefit of the Bitcoin community and the world.' |

| | | | Source: Blockstream patent pledge (2017) |
|---|---|---|---|
| | | | |

## Discussion

[To be added]

## Conclusion

This study has provided empirical evidence for the rationales why firms conduct patent pledges. Our results show that *'Driving technology diffusion and ecosystem and infrastructure building'* is indeed the primary motive and confirms what the literature has suggested. Furthermore, the motives *'Building reputation and PR'* and *'Decreasing uncertainty and patent threats'* are of major importance. Despite their different names, we show that all motives for free patent pledges link to technology diffusion, either as upstream or downstream motives. Therefore, we expand the knowledge about this important phenomenon and strengthen its link to the vast literature about technology diffusion.

## References

[1] Oliver Alexy, Paola Criscuolo, and Ammon Salter. "Does IP Strategy Have to Cripple Open Innovation ?" In: MIT Sloan Management Review 51.1 (2009), pp. 71–77.

[2] Oliver Alexy, Gerard George, and Ammon J Salter. "Cui Bono? The selective revealing of knowledge and its implications for innovative activity". In: Academy of Management Review 38.2 (2013), pp. 270–291.

[3] Oliver Alexy and Markus Reitzig. "Private – collective innovation, competition, and firms' counterintuitive appropriation strategies". In: Research Policy 42 (2013), pp. 895–913. ISSN : 0048-7333.

[4] Oliver Alexy et al. "Surrendering control to gain advantage: Reconciling openness and the resource-based view of the firm". In: Strategic Management Journal 39 (2018), pp. 1704–1727.

[5] Robert C Allen. "Collective Invention". In: Journal of Economic Behavior and Organization 4 (1983), pp. 1–24.

[6] Kenneth Arrow. "Economic welfare and the allocation of resources for invention". In: The Rate and Direction of Inventive Activity: Economic and Social Factors. Ed. by R. R. Nelson. Princeton University Press, 1962, pp. 609–626.

[7] Pratima Bansal and Kendall Roth. "Why Companies Go Green: A Model of Ecological Responsiveness". In: The Academy of Management Journal 43.4 (2000), pp. 717–736.

[8] Jonathan M Barnett. "The Hosts Dilemma: Strategic forfeiture in platform markets for informational goods". In: Harvard Law Review 124.8 (2011), pp. 1861 1938.

[9] Ataur Rahman Belal and David L Owen. "The Views of Corporate Managers on the Current State of , and Future Prospects for, Social Reporting in Bangladesh: An Engagement Based study". In: Accounting, Auditing & Accountability Journal 20.3 (2007), pp. 472–494.

[10] Izak Benbasat, David K Goldstein, and Melissa Mead. "The Case Research Strategy in Studies of Information Systems". In: MIS Quarterly 11.3 (1987), pp. 369–386.

[11] Patrick Biernacki and Dan Waldorf. "Snowball sampling: Problems and Techniques of Chain Referral Sampling". In: Sociological Methods & Research 10.2 (1981), pp. 141–163.

[12] John L. Campbell et al. "Coding In-depth Semistructured Interviews: Problems of Unitization and Intercoder Reliability and Agreement". In: Sociological Methods and Research 42.3 (2013), pp. 294–320.

[13] Henry W. Chesbrough. "The logic of open innovation: managing intellectual property". In: California Management Review 45.3 (2003), pp. 33–58.

[14] Colleen V. Chien. "Opening the patent system: Diffusionary levers in patent law". In: Southern California Law Review 89.4 (2016), pp. 793–863.

[15] Jorge L. Contreras, Bronwyn H. Hall, and Christian Helmers. "Assessing the Effectiveness of the Eco-Patent Commons: A Post-mortem Analysis". In: CIGI Papers 161 (2018).

[16] Jorge L. Contreras and Meredith Jacob. Patent Pledges: Global Perspectives on Patent Law's Private Ordering Frontier. Edward Elgar Pub., 2017.

[17] Johnnie Daniel. Sampling Essentials: Practical Guidelines for Making Sampling Choices. Sage Publications, Inc., 2012.

[18] Harold Demsetz. "Towards a Theory of Property Rights". In: The American Economic Review 57.2 (1967), pp. 347–359.

[19] Jonas Fabian Ehrnsperger and Frank Tietze. "Patent pledges, open IP or patent pools? Developing taxonomies in the thicket of terminologies". In: PLoS ONE 14.8 (2019), pp. 1–18.

[20] Kathleen M. Eisenhardt. "Building Theories From Case Study Research". In: Academy of Management Review 14.4 (1989), pp. 532–550.

[21] Kathleen M. Eisenhardt and Melissa E. Graebner. "Theory Building from Cases: Opportunities and Challenges". In: Academy of Management Journal 50.1 (2007), pp. 25–32.

[22] Patrick J. Fahy. "Addressing some Common Problems in Transcript Analysis". In: The International Review of Research in Open and Distributed Learning 1.2 (2001), pp. 1–6.

[23] Johann Füller. "Refining Virtual Co-Creation from a Consumer Perspective". In: California Management Review 52.2 (2010), pp. 98–122.

[24] Barney G Glaser and Anselm L Strauss. The Discovery of Grounded Theory: Strategies for Qualitative Research. Vol. 1. 4. 1967, p. 271.

[25] Keith Goffin and Ursula Koners. "Tacit Knowledge, Lessons Learnt, and New Product Development". In: Journal of Product Innovation Management 28 (2011), pp. 300–318.

[26] Keith Goffin et al. "State-of-the-art: The quality of case study research in innovation management". In: Journal of Product Innovation Management 36.5 (2019), pp. 586–615.

[27] Guy Hadash et al. "Estimate and Replace: A Novel Approach to Integrating Deep Neural Networks with Existing Applications". In: arXiv preprint arXiv:1804.09028 (2018).

[28] Eric von Hippel and Georg von Krogh. "Open Source Software and the "Private-Collective" Innovation Model: Issues for Organization Science". In: Organization Science 14.2 (2003), pp. 209–223.

[29] Ole R. Holsti. Content analysis for the social sciences and humanities. Reading, Mass.: Reading, Mass.: Addison-Wesley Pub. Co., 1969.

[30] Hsiu-Fang Hsieh and Sarah E. Shannon. "Three Approaches to Qualitative Content Analysis". In: Qualitative Health Research 15.9 (2005), pp. 1277–1288.

[31] George Kour and Raid Saabne. "Fast classification of handwritten on-line Arabic characters". In: Soft Computing and Pattern Recognition (SoCPaR), 2014 6th International Conference of. IEEE. 2014, pp. 312–318.

[32] George Kour and Raid Saabne. "Real-time segmentation of on-line handwritten arabic script". In: Frontiers in Handwriting Recognition (ICFHR), 2014 14th International Conference on. IEEE. 2014, pp. 417–422.

[33] Josh Lerner and Jean Tirole. "Some Simple Economics of Open Source". In: The Journal of Industrial Economics 50.2 (2002), pp. 197–234.

[34]  Joseph A. Maxwell. "Using numbers in qualitative research". In: Qualitative Inquiry 16.6 (2010), pp. 475–482.

[35] Philipp Mayring. "On Generalization in Qualitatively Oriented Research". In: Forum: qualitative social research 8.3 (2007).

[36] Mancur Olson.
The Logic of Collective Action: Public Goods and the Theory of Groups. Cambridge, MA: Harvard University Press, 1971.

[37]
Eric S. Raymond. The Cathedral & the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary. O'Reilly Media, 2001.

[38] Matthew Rimmer. "Elon Musk's Open Innovation: Tesla, Intellectual Property, and Climate Change". In: Intellectual Property and Clean Energy. Ed. by Matthew Rimmer. Springer Nature Singapore, 2018, pp. 515–551.

[39] Johnny Saldaña.
The Coding Manual for Qualitative Researchers. Thousand Oaks, CA: SAGE Publications, 2009.

[40] Martin Schreier, Christoph Fuchs, and Darren W. Dahl. "The Innovation Effect of User Design: Exploring Consumers ' Innovation Perceptions of Firms Selling Products Designed by Users". In: Journal of Marketing 76. September (2012), pp. 18–32.

[41] Tim Schweisfurth, Christina Raasch, and Cornelius Herstatt. "Free revealing in open innovation: A comparison of different models and their benefits for companies". In: International Journal of Product Development 13.2 (2011), pp. 95–118.

[42] David J Teece. "Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world". In: Research Policy 47 (2018), pp. 1367–1387.

[43] Wen Wen, Marco Ceccagnoli, and Chris Forman. "Opening Up Intellectual Property Strategy: Implications for Open Source Software Entry by Start-up Firms". In: Management Science 62.9 (2016), pp. 2668–2691.

[44] Joel West and Scott Gallagher. "Challenges of open innovation : the paradox of firm investment in open-source software". In: R&D Management 36.3 (2006), pp. 319–332.

[45] Robert K. Yin. Case Study Research: Design and Methods. 4th edition. Sage Publications, Inc., 2009.

[46] Nicole Ziegler, Oliver Gassmann, and Sascha Friesike. "Why do firms give away their patents for free?" In: World Patent Information 37 (2014), pp. 19–25.

[47] Nancy Zinatelli, Paul B. Cragg, and Angele L.M. Cavaye. "End user computing sophistication and success in small firms". In: European Journal of Information Systems 5.3 (1996), pp. 172–181.

# Appendix

| Participant No. | Economical | | | | | Perceptional | | | | | | Technological | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Driving technology diffusion and ecosystem and infrastructure building | Encouraging competition | Fostering collaboration, open Innovation, and recource pooling | Fostering network effects and economies of scale | Promoting additional monetization | Attracting attention and providing clarification | Building reputation and PR | Decreasing uncertainty and patent threats | Fostering integrity | Fostering sustainability | Showing social responsibility | Improving and fostering technology and innovation | Standard setting and fostering interoperability |
| 1 | 9* | 0 | 0 | 0 | 0 | 1* | 1 | 0 | 0 | 2* | 2* | 0 | 0 |
| 2 | 1* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 9* | 0 | 0 | 1* | 0 | 1* | 0 | 2* | 0 | 1* | 3* | 0 | 0 |
| 4 | 1 | 0 | 1* | 1* | 0 | 0 | 6* | 2* | 0 | 0 | 1 | 0 | 0 |
| 5 | 0 | 0 | 1* | 0 | 0 | 0 | 1* | 1* | 0 | 0 | 0 | 1* | 0 |
| 6 | 3* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 3* | 0 | 1* | 0 | 0 | 0 | 1 | 2* | 0 | 0 | 1* | 0 | 0 |
| 8 | 2* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 4* | 0 | 0 | 0 | 0 | 0 | 1* | 1* | 0 | 0 | 0 | 1* | 0 |
| 11 | 1* | 0 | 0 | 0 | 0 | 0 | 0 | 4* | 0 | 0 | 1* | 1* | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 1* | 1* | 0 | 1 | 0 | 0 | 0 |
| 13 | 1* | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 2* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 3* | 0 | 0 | 0 | 0 | 0 | 0 | 2* | 0 | 0 | 1* | 2* | 0 |
| 16 | 4* | 0 | 0 | 2* | 0 | 0 | 0 | 1* | 0 | 0 | 0 | 0 | 1 |
| 17 | 8* | 0 | 0 | 0 | 0 | 0 | 7* | 0 | 0 | 0 | 1 | 0 | 0 |
| 18 | 10* | 0 | 0 | 0 | 0 | 0 | 1* | 6* | 0 | 0 | 0 | 0 | 0 |
| 19 | 1* | 0 | 1* | 0 | 0 | 0 | 1* | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 1* | 0 | 2* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2* |
| 21 | 0 | 0 | 0 | 0 | 0 | 2* | 4* | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 1* | 1* | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Total count | 63 | 0 | 6 | 5 | 1 | 4 | 26 | 23 | 0 | 4 | 11 | 5 | 3 |
| Share of participants showing strong evidence — All | 73% | 0% | 23% | 18% | 5% | 14% | 36% | 45% | 0% | 9% | 23% | 18% | 5% |
| Share of participants showing strong evidence — Pledging only | 80% | 0% | 20% | 13% | 7% | 13% | 40% | 47% | 0% | 7% | 27% | 20% | 7% |

*showing strong evidence
Highlighted participants represent pledging interviewees.

DRAFT Motives for Patent Pledges: A Qualitative Study

| Pledging Organisation(s) | Date | Economical | | | | | Perceptional | | | | | | Technological | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Driving technology diffusion and ecosystem and infrastructure building | Encouraging competition | Fostering collaboration, open Innovation, and resource pooling | Fostering network effects and economies of scale | Promoting additional monetization | Attracting attention and providing clarification | Building reputation and PR | Decreasing uncertainty and patent threats | Fostering integrity | Fostering sustainability | Showing social responsibility | Improving and fostering technology and innovation | Standard setting and fostering interoperability |
| Alcatel-Lucent et al.[1] | 2008 | 8 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 1 | 0 | 1 | 0 | 0 |
| Apple[1] | 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Blackboard[1] | 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blockstream[1] | N/A | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 1 | 0 |
| CMAF[1] | N/A | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| Computer Associates[1] | 2005 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Eco-Patent Commons[3] | N/A | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 |
| Ericsson[1] | 11.2012 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Ericsson[1] | 1.2012 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Ford Motor[2] | 2015 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| Google - OPN[1] | N/A | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 |
| Google[1] | 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| GreenXchange[3] | N/A | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 4 | 0 |
| iBiquity[1] | 2005 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| IBM[1] | 10.2005 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| IBM[1] | 2006 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 1 | 3 | 0 |
| IBM[1] | 1.2005 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| IBM[1] | 2007 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Intel[1] | N/A | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Max Planck Gesellschaft[4] | N/A | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Microsoft[1] | 7.2006 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Microsoft[1] | 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Microsoft[1] | 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| Microsoft[1] | 2003 | 6 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 5 | 4 |
| Microsoft[1] | 2012 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Microsoft[1] | 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Microsoft[1] | 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Microsoft[1] | 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MIT et al.[4] | N/A | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Monsanto[4] | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Myriad Genetics[4] | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| Nokia[1] | 2010 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 |
| Nokia[1] | 2005 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 |
| Nokia[1] | 2002 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| NTT et al.[1] | 2002 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| OIN[1] | 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Open POWER Foundation[1] | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OSGi et al.[1] | 2006 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 |
| OWF CAgreement 1.0[1] | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| QR Code[1] | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Qualcomm[1] | 2008 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| Red Hat[1] | 2002 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Samsung[1] | 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SCE[1] | 2008 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Sun Microsystems[1] | 9.2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| Sun Microsystems[1] | 1.2005 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 2 | 0 | 0 | 4 | 0 |
| Tesla Motors[2] | 2014 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| ThePatentPledge.org[1] | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Toyota[2] | 2015 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 |
| Vodafone[1] | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Total count | | 65 | 6 | 11 | 2 | 3 | 0 | 0 | 35 | 18 | 8 | 11 | 49 | 17 |
| ICT count | | 49 | 6 | 6 | 2 | 3 | 0 | 0 | 35 | 13 | 0 | 7 | 35 | 17 |
| Sustainability count | | 5 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 2 | 5 | 0 |
| Automotive count | | 7 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 8 | 0 |
| Life Science count | | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 |

Industry key:
1=ICT  2=Automotive  3=Sustainability  4=Life Science