Defensive publishing as an intellectual property strategy in the Aotearoa New Zealand life science industry

Alice C. R. Jones

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Abstract

Defensive publication is the practice of publishing an invention into the public domain to prevent subsequent patenting. By voiding any claim to novelty, the publication acts as a defence against an exclusivity right being granted. This intellectual property management strategy has been examined in the literature regarding frameworks of open knowledge, cumulative innovation and in patent races. However, there is little empirical research of the practice. The present qualitative research study examines attitudes towards defensive publication in the life science industry in Aotearoa New Zealand. Interviews were conducted with leading intellectual property practitioners in the sector, to understand the frequency with which the strategy is used, under what conditions, and why it may be used in place of, or in combination with other intellectual property management approaches. Data was analysed using a reflexive thematic analysis approach, producing results in the form of themes. Findings included the rarity of the strategy in the sector, contexts in which it may be useful, variations in definitions of defensive publishing between participants, the peculiarity and influence of the United States industry and legislation, and tensions between philosophical and commercial attitudes towards knowledge management. This research offers insight into the hidden decision-making of patent attorneys in the life science sector in Aotearoa New Zealand and suggests contexts where defensive publications may complement established patenting practices.

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1. Introduction

1.1 Legal frameworks of intellectual property

1.1.1 A brief history of patents

Private ownership of intellectual property has a long history in Western civilisation. The first recorded patent was granted in 1421 in Florence, Italy, for the manufacture of a barge hoist used to transport marble.[1] The inventor, Filippo Brunelleschi (1377-1446), an Italian architect and engineer, was granted a three-year monopoly on the invention by the Florentine Republic.[2] Over the next two centuries, patenting spread throughout Europe, represented in England by the Statute of Monopolies 1623, to which patenting in common law countries can be traced back to. The British colonisation of Aotearoa New Zealand resulted in the formation of The Patents Act 1860, only 20 years after the signing of the Treaty of Waitangi, closely resembling similar British law at the time. [3] This Act of Parliament was updated in 1953,[4] and the current iteration in 2013.[5] Until 1994, the requirements, duration of monopoly, application and examination process, and relevant prior art of patents varied significantly between jurisdictions. This was largely unified by the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement.[6] This resulted in minimum standards of protection, duration of protection, prior art,

1 Fisher, W. W. "Patent". Encyclopedia Britannica, 27 Dec. 2023, Available at: https://www.britannica.com/topic/patent. Accessed 11 February 2024.
2 Boutier, J. & Sintomer Y. *The Republic of Florence (from twelfth to sixteenth centuries)*. Revue française de science politique Volume 64, Issue 6, 2014. Available at: https://www.cairn-int.info/article-E_RFSP_646_1055--the-republic-of-florence-from-the-12th.html
3 Intellectual Property Office of New Zealand (IPONZ). *History of IP in New Zealand.* Available at: https://www.iponz.govt.nz/about-iponz/history-of-ip-in-new-zealand/#:~:text=1860%3A%20The%20first%20New%20Zealand,administered%20by%20the%20Colonial%20Secretary.
4 Patents Act 1953
5 Patents Act 2013
6 World Trade Organisation (WTO). *Overview: the TRIPS Agreement.* Available at: https://www.wto.org/english/tratop_e/trips_e/intel2_e.htm

enforcement of patent rights, and dispute settlements to be unified between member states of the World Trade Organisation.

1.1.2 Patent requirements

The requirements for patentability are the criteria an invention must meet to qualify for patent protection. These include novelty, non-obviousness (inventive step) and utility.[7] The subject matter must also be eligible for patent protection, and the patent specification must provide a sufficient written description of the invention so that a third party is able to recreate it. This is known as the enablement requirement.

The novelty requirement specifies that an invention must be truly new and not previously disclosed to the public before the filing date of the patent application.[8] Novelty is assessed through a thorough examination of the prior art (see section 1.2 Prior art).

The invention must also involve an inventive step that is not obvious to someone skilled in the art.[9] In other words, it should not be something that would be obvious for an experienced person working in the area of technology to come up with based on existing knowledge.

The invention must also have utility, meaning it should be capable of being used or applied in some way that is useful.

The invention must fall within the categories of patentable subject matter, which is described in the Patents Act 2013 as "a manner of manufacture within the meaning of section 6 of Statute of Monopolies", as in, the British Law of 1623 described above. While "manner of

7 Jacob, R. (2016) *IP and Other Things: A Collection of Essays and Speeches*, E.I.P.R. 2016, 38(4), 251-252
8 World Intellectual Property Office (WIPO). *PCT International Search and Preliminary Examination Guidelines. Chapter 12: Meaning of Novelty*. Available at:https://www.wipo.int/pct/en/texts/ispe/12_01_02.html
9 Sumpter, P. 'Patents', *Intellectual Property in New* Zealand (Auckland: Auckland University Press, 2015), p59.

manufacture" is not particularly descriptive, patentable inventions are typically new manufacturing processes, chemical compounds, biotechnological products, devices, or business methods. Subject matter that is not patentable in New Zealand includes inventions relating to the generation of human beings, methods of medical treatment,[10] and inventions that disobey public order. In Aotearoa New Zealand, this is particularly important in relation to mātauranga Māori and provisions of ownership over indigenous flora and fauna.

The patent application must enable a person skilled in the relevant field to make and use the invention based on the information provided in the written description. This requirement ensures that the invention is described in sufficient detail to allow others to replicate it.[11] Inventions that are not 'enabled' do not fulfil aspects of the patent bargain (see section 1.3 The patent bargain). The detail contained within the description of the invention must also adequately show that the inventor produced the invention, rather than merely an idea of it.

Meeting these requirements ensures that patents are granted only for inventions that are truly novel, inventive, useful, and adequately disclosed, thereby promoting innovation while providing legal protection for inventors.

1.2 Prior art

Prior art in intellectual property refers to any evidence that an invention or idea is not new or original.[12] It encompasses a broad range of publicly available information predating the filing date of a patent application. This includes published documents such as scientific papers, patents, technical manuals, and textbooks that describe similar inventions or ideas.

10 Although allowed in Australia and the United States. See: Sumpter P. (2015) *Intellectual Property in New Zealand: A User's Guide to Copyright, Patents, Trade Marks and More*. Auckland University Press.
11 Lefstin, J. A. (2008). *The formal structure of patent law and the limits of enablement*. Berkeley Tech. LJ, 23, 1141.
12 Sumpter, above n 10.

Additionally, prior art can consist of publicly available products, processes, or technologies, as well as any public use, sale, or disclosure of the invention. The consideration of prior art is crucial in assessing the novelty and non-obviousness of a claimed invention, ensuring that patents are granted only for truly new and inventive concepts.

1.3 The patent bargain

The patent bargain refers to the implicit agreement between inventors and society that justifies the patent system. Governments grant inventors an exclusivity right to their inventions for a 20-year period in exchange for disclosing their inventions to the public. The right to enforce a monopoly, and therefore set a premium price for an invention for the lifetime of the patent, is exchanged for the invention to be made available for all to make, use and sell, after the patent has expired.[13,14]

The most important purpose of the bargain is incentivising investment in research and development (R&D) that results in innovation.[15] Patents provide an assurance that once a product makes it to market, there is a period of time when the inventor can recoup the investment by setting a premium price, with no competition. Without this protection, there is little incentive to invest the vast resources needed to produce innovative products, especially in the pharmaceutical and biotechnology sectors, which have high R&D costs and lengthy product development timelines.[16] It also encourages knowledge disclosure (as opposed to

13 Strandburg, K. J. (2004). What Does the Public Get-Experimental Use and the Patent Bargain. *Wis. L. Rev.*, 81.
14 Devlin, A. (2009). The misunderstood function of disclosure in patent law. Harv. JL & Tech., 23, 401.
15 Grabowski, H. (2002). Patents, innovation and access to new pharmaceuticals. Journal of International Economic Law, 5(4), 849-860.
16 Grabowski, H. G., DiMasi, J. A., & Long, G. (2015). The roles of patents and research and development incentives in biopharmaceutical innovation. Health Affairs, 34(2), 302-310.

trade secrets), continued innovation, and attempts to balance the interests of inventors with the interests of the public.[17]

Critics of the patent system argue that the bargain is often not fulfilled, and unfairly benefits the interests of inventors compared to public interests. Practices such as evergreening,[18] pay-for-delay settlements,[19] and defensive patenting,[20] can artificially extend patent protection periods to increase the period a monopoly is enforceable.[21] This has implications for access to medicines, particularly in low-income countries which cannot afford premium prices, and are waiting for generics to enter the market.[21,22] These potentially anti-competitive behaviours undermine public interests intended by the patent bargain.[23]

1.4 Defensive publishing

Defensive publication is the practice of publishing into the prior art to prevent subsequent patent and maintain freedom to operate (FTO). It is a useful method for securing FTO when trade-secret protection is ineffective, and the cost of patenting outweighs the benefit of an exclusivity right. Once in the public domain, an invention can be freely used. Defensive

17 Wright, B. D. (1983). The economics of invention incentives: Patents, prizes, and research contracts. The American Economic Review, 73(4), 691-707.
18 Hemphill, C. S., & Sampat, B. N. (2012). Evergreening, patent challenges, and effective market life in pharmaceuticals. Journal of health economics, 31(2), 327-339.
19 The pay-for-delay dilemma describes large corporations making settlements with potential rivals, to prevent them entering the market and maintaining a monopoly. See: Hemphill, C. S. (2006). Paying for delay: Pharmaceutical patent settlement as a regulatory design problem. NYUL Rev., 81, 1553.
20 Defensive patenting is a separate strategy from defensive publication, discussed in section *2.2.1.1 Defensive patenting*. See also: Ullrich, H. (2013). Strategic patenting by the pharmaceutical industry: towards a concept of abusive practices of protection. In Pharmaceutical Innovation, Competition and Patent Law (pp. 241-272). Edward Elgar Publishing.
21 Matthews & Gurgola (2016) Patent strategies and competition law in the pharmaceutical sector: implications for access to medicines, E.I.P.R. 2016, 38(11), 661-667
22 Khachigian, L. M. (2020). Pharmaceutical patents: reconciling the human right to health with the incentive to invent. Drug Discovery Today, 25(7), 1135-1141.
23 Abbas, M. Z. (2019). Evergreening of pharmaceutical patents: A blithe disregard for the rationale of the patent system. Journal of Generic Medicines, 15(2), 53-60.

publishing is offered by scholars as both an antidote to out-of-control monopolisation, and as a complementary strategy to patenting.[24]

[24] Johnson, J.P., *Defensive publishing by a leading firm.* Information Economics and Policy, 2014. **28**: p. 15-27.

2. Literature Review

This literature review will cover the research to date of defensive publishing. Firstly, an explanation of how defensive publishing fits within intellectual property law and interacts with the legal framework of patenting.

Secondly, the frequency and methods of disclosure, which include the patent system itself, scientific journals, disclosure databases and historical channels for disclosure that no longer operate.

Thirdly, the bulk of the review considers the research of defensive publishing rationale and incentives. This includes four themes; (i) maintaining freedom to operate, (ii) the importance of dissemination of knowledge in advancing scientific research, with a special consideration of the private ownership of genetic material, (iii) promoting cumulative innovation, and (iv) using defensive publishing in patent races.

Finally, this review considers the methods that have been employed to research defensive publishing, finding little empirical study existing in the field. A suggestion is made for further empirical research to be conducted.

2.1 Legal framework of defensive publishing

The primary cost of defensive publishing is that it discloses technical information, which has the consequence of providing rivals with free access to use the innovation. [25] The main benefit is that it prevents anyone (including the publishing firm) from subsequent patenting, and

25 Johnson, above n 24.

therefore a monopoly. This guarantees the publishing firm the right to appropriate value from the innovation.

2.1.1 Novelty and prior art

A defensive publication prevents patenting by interfering with the novelty requirement. The novelty requirement in a patent application asserts that an invention must not already exist in the prior art, because an inventor hardly deserves to be awarded a legally enforceable monopoly if their invention already exists.[26] The creation of prior art, therefore, can pre-emptively prevent a patent from being awarded to subsequent inventors. Of course, the prevention of patentability includes the original inventor. The decision to publish, therefore, irreversibly surrenders the inventor's potential patent rights[27]. Because of this, publication is often viewed as a blunder, a spill-over of knowledge into the public domain that prevents patent protection and reduces the value of the intellectual property asset.

2.2 Methods of defensive publishing

2.2.1 The patent system

Using the patent system for defensive purposes has been studied as early as the 1950s.[28] There is an important distinction to be made between the easily confused phenomenon *defensive patenting* and using the patent system for defensive publishing.

2.2.1.1 Defensive patenting

A defensive patent may be described as a patent that is purposefully obtained to prevent a competitor from obtaining a patent and establishing a market monopoly in the field of the

26 Patents Act 2013, s 6.
27 Johnson, above n 24.
28 Ericson, W.L. and I.M. Freedman, *Publication in Lieu of Patents: Defensive Patenting and the Welfare of the Patent System*. 1957, HeinOnline. p. 78.

invention.[29] An *offensive* patent on the other hand, has the primary purpose of establishing a monopoly and asserting the right to prevent others from making, using and selling an invention. The key difference is that the monopoly afforded by a patent is rarely exploited by the inventor in defensive cases.

It has been estimated that one-third of all patents in the 1950s in the United States were filed for defensive purposes.[30] The inventions disclosed were not intended to be manufactured or sold by the inventor, but rather solely to prevent competitors from obtaining a patent and establishing market monopolies. This strategy, while successfully blocking competitors from entering the market, also effectively prevents the public from having access to innovative products and undermines the social contract implied by the patent system. This highly defensive strategy persists in some forms, where firms use the patent system to generate revenue through litigation. At the time, the United States patent office (now United States Patent and Trademark Office, USPTO), was so overrun with patent filings, it was estimated a patent application took 3 years and 5 months to be granted. As of 25th January 2024, a request for examination of a biotechnology patent in Aotearoa New Zealand is estimated to take 2 years and 10 months.[31] A study of 457 German firms from 1990-2001 found that almost 4% had a blocking motivation for patent filings.[32]

[29] Rimmer (2004) *The Race to Patent the SARS Virus: The Trips Agreement and Access to Essential Medicines*. 5 Melb. J. Int'l L. 335.
[30] Ericson & Freedman, above n 28.
31 Intellectual Property Office of Aotearoa New Zealand (IPONZ). *Timeframes - Processing times for applications and correspondence.* Available at: https://www.iponz.govt.nz/support/timeframes/
32 Blind, K., Cremers, K., & Mueller, E. (2009). *The influence of strategic patenting on companies' patent portfolios*. Research Policy, 38(2), 428-436.

In contrast, using the patent system as a channel for defensive publishing does not block competitors from the marketplace, it merely prevents any party (including the inventor) from establishing a monopoly.

"Defensive" in both cases means the inventor's FTO is not curtailed by any other party, however in the case of defensive publishing, it also prevents the existence of a market monopoly and any grounds for preventing the making, using or selling of an invention under patent law. When the patent system is used for defensive publishing, typically the patent application will not be submitted for examination and is effectively abandoned by the applicant. In Aotearoa New Zealand, patent specifications are published 18 months after the priority date, if the application is not withdrawn. The applicant must request examination within five years of the filing date.[33] After this time, the patent application becomes ineligible for examination and simply becomes part of the prior art.

Using the patent system for defensive publication has several benefits, including the searchability of the database by patent examiners, the familiarity of the patent format and the extended timeframe for decision making about the fate of the patent application.[34] An applicant unsure about whether to patent or publish is likely to use this channel, given both options remain open until examination must be requested.

2.2.2 Scientific journals

While scientific journals have broad publication goals, they are also a useful channel for defensive publication. There are many similarities between publication in the traditional

33 Intellectual Property Office of Aotearoa New Zealand (IPONZ). *Examination process*. Available at: https://www.iponz.govt.nz/about-ip/patents/process/.
34 Adams, S. and V. Henson-Apollonio, Defensive publishing: a strategy for maintaining intellectual property as public goods. 2002.

academic sense and publication to defend the right to extract value from intellectual property. In a general sense, dissemination of credible information in order to inform and stimulate scientific research is the goal of academically-motivated publishing. This is illustrated by the mission statement of the preeminent scientific journal, *Nature.*

> *"…to serve scientists through prompt publication of significant advances in any branch of science… ensure that the results of science are rapidly disseminated to the public."*[35]

Scientific journals provide an easily searchable database and a date of publication that is verified by a third party. Peer review also improves the credibility of the research and makes it more likely that innovators in the field are likely to come across the disclosure.

The main drawback of publishing through scientific journals is that the publishing party does not have complete control over the publishing date and may be limited in the content of information. For example, large amounts of experimental or genetic sequences would not be included in a peer-reviewed paper.[36] The mission statement of the British Medical Journal, for example, includes the provision for publications to be "entertaining", which precludes some content that an inventor may wish to disclose.[37]

2.2.3 Disclosure databases

Specialised providers for defensive publishing provide platforms for public disclosure of inventions. The two most prominent of these is researchdisclosure.com and the Prior Art Database hosted by IP.com.

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35 Nature. Nature's mission statement. *Journal information*. Available at: https://www.nature.com/nature/journal-information.
36 Adams & Henson-Apollonio, above n 34.
37. BMJ *Mission Statement.* Available at: https://www.bmj.com/content/suppl/2002/01/03/324.7328.5.DC1

IP.com describes itself as the largest online prior art disclosure service, and defensive publishing as a "cost effective IP-strategy".[38] Research Disclosure was established in 1960, and describes themselves as "the industry standard defensive publication service".[39] Publication on the Research Disclosure database currently costs $USD425 or 360Euro per publication.

2.2.4 Gray literature

Disclosures can also be made through less formal channels, such as prototypes displayed at tradeshows, press releases, brochures, package inserts and self-published articles.[40,41] These channels are referred to collectively as "gray literature".[42] It is a less useful channel for defensive publishing as it is not systemically archived, searchable and does not have a reliable recorded date of publication, making its priority difficult to prove in court.[43]

2.2.5 Historical channels

2.2.5.1 Defensive publication and SIR programs

In the past, the United States has made attempts to formalise defensive publications through the USPTO. The Defensive Publication Program was introduced in 1968 and published unexamined applications with the kind code "T" (for technical disclosure). In 1985, the program was replaced with the Statutory Invention Register (SIR).[44]

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38 IP.com. *Prior Art Database*. An essential source of non-patent literature. [cited 2023; Available from: https://priorart.ip.com/index.html

39 Questel. *Research Disclosure*. [cited 2023; Available from: https://www.researchdisclosure.com]

40 Adams & Henson-Apollonio, above n 34.

41 Gill, D., *Strategic disclosure of intermediate research results.* Journal of Economics & Management Strategy, 2008. **17**(3): p. 733-758.

42 Adams & Henson-Apollonio.

43 Adams & Henson-Apollonio.

44 Guffey, W.R., *Statutory Invention Registration: Defensive Patentability.* Golden Gate UL Rev., 1986. **16**: p. 291.

In contrast to the earlier program, the SIR application was reviewed by the patent office. This was proposed to be superior to defensive publication in a scientific journal, as the examiner could advise whether the complete specification was sufficient to prevent subsequent patenting.[45] They were given the kind code "H". At the time of establishing the SIR program, it was proposed The SIR program will:

> *"be of considerable benefit to governmental agencies and organizations who publish research results for defensive purposes, but of little benefit to individuals and organizations who seek commercial profit from their inventions."*[46]

However, later scholarly analysis finds defensive intellectual property strategies can and do have benefit to commercial, profit-seeking organisations.[47] When United States patent applications started to become published in 2000, SIRs became essentially redundant, as it was less expensive for an applicant who wanted their invention published for defensive purposes to file a regular application, then abandon it after publication. SIRs were eliminated by the 2011 Leahy-Smith America Invents Act.[48]

Neither version of the program was widely used. In the 20 years the Defensive Publication Program was active, approximately 5,000 unexamined applications were published. The SIR program had even less engagement, with only 2,266 SIR documents published between 1985 to 2014.[49] This may be due to the preposition that these programs were not set out to be

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45 Guffey, above n 44.
46 Guffey.
47 Bar-Gill, O. and G. Parchomovsky, *The value of giving away secrets.* Va. L. Rev., 2003. **89**: p. 1857
48 Bui, H.H., *Navigating the Leahy-Smith America Invents act including effective dates for patent reform.* J. Pat. & Trademark Off. Soc'y, 2011. **93**: p. 441.
49 Patent Librarian's Notebook. *Statuatory Invention Registration Abolished* 2013 [cited 2023; Available from: https://patentlibrarian.com/2013/06/02/statutory-invention-registration-abolished/.]

beneficial to commercial endeavours, resulting in a lack of engagement from commercial R&D companies.

2.2.5.2 IBM disclosure bulletin

Compared to government-led initiatives to promote defensive publishing, private endeavours to disclose inventions have been used extensively. The most well-known example is the IBM disclosure bulletin, which was active between 1958-1998, which published aspects of IBM inventions into the public domain in a newsletter style.[50] During the time the bulletin was active, paper copies were distributed to patent offices by IBM.[51] The bulletin is considered one of the most successful forums for defensive disclosure, and has been cited over 48,000 times by United States patents.[52]

2.3 Maintaining freedom to operate

Freedom to operate (FTO) is the main criteria for appropriating value from an invention. While a granted patent can help secure FTO, it can also be established through defensive publication. In the pharmaceutical industry, trade secrecy of formulations is seldom used. Because small molecule pharmaceuticals can be easily reverse engineered by a competitor, trade secrets are generally an ineffective method to protect the matter of composition. Furthermore, if another party reinvents and patents the invention, the original party loses FTO.[53]

50 Barrett, B., *Defensive use of publications in an intellectual property strategy.* Nature Biotechnology, 2002. **20**(2): p. 191-193.
51 Baker, S. and C. Mezzetti, *Disclosure as a Strategy in the Patent Race.* The Journal of Law and Economics, 2005. **48**(1): p. 173-194.
52 Hattenbach, B. and J. Glucoft, *Patents in an era of infinite monkeys and artificial intelligence.* Stan. Tech. L. Rev., 2015. **19**: p. 32
53 While "prior use" can be used in this case to maintain FTO, it is litigious, expensive and not very reliable. A recent example is the patent battle of the use of CRISPR technology in eukaryotic cells, which has required detailed analysis of years of laboratory notebooks. See: Ledford, H. Bitter fight over CRISPR patent heats up. Nature 529, 265 (2016). https://doi.org/10.1038/nature.2015.17961

Defensive publishing is a useful salve against parties which have been referred to as patent trolls, patent pirates, and non-practicing entities, who seek revenue via litigation[55,56]. These parties may file for broad patent protection of inventions, or purchase swathes of patents in a particular technology area, solely to later sue manufacturers and distributers for infringement. Defensive publication protects against these parties from controlling markets in which they do not actively participant in.

Defensive publications are also useful against *bad patents*[57] which are those granted by patent offices which do not fulfil the requirements usually required to deserve a monopoly. The most common cause of bad patents is the lack of an *inventive step* above the state of the art. The granting of this class of bad patents allows the patent holder to hold others infringing on their patent, who may have considered the invention too trivial to seek patent protection.
Many researchers claim defensive publication should only be used when the cost of patenting is not justified by the value of the patent monopoly and when trade secrets are ineffective[58,59]
Scotchmer (1990) writes that:

"The value of a patent is determined by the competitive advantage it confers and by the period of time during which this advantage exists" [60]

[55] Johnson, above n 24.
[56] Hattenbach & Glucoft, above n 52.
[57] Johnson, above n 24.
[58] Barrett, above n 50.
59 Maloney, N., *The defensive publication: a patent alternative.* New Hampshire Business Review, 2003. **25**(8): p. 5B.
60 Scotchmer, S. and J. Green, *Novelty and Disclosure in Patent Law.* The RAND Journal of Economics, 1990. **21**(1): p. 131-146.

Therefore, patents are of limited value include for inventions that are unlikely to have long-term marketability, small markets that premiums cannot be extracted from, and when the incremental invention is already covered by another patent.[61]

2.3.1 Protecting a core patent

A firm holding a core patent may have an incentive to publish minor improvements.[62,63] This protects freedom to operate of the core patent by preventing others from patenting a minor improvement and avoids the high cost of 'blanket patenting'. The benefit of publishing minor improvements is expanded upon in section 2.5 Cumulative innovation.

2.4 Knowledge dissemination and scientific progress

The extensive privatisation of knowledge has many critics, especially knowledge that was generated using public funds. The United States Bayh-Dole Act of 1980, which allowed patents to be granted on inventions created by researchers at public universities, introduced a new era of commercialisation of research. [64] However, increased patenting activity of research scientists may be eroding the public domain.[65] By limiting dissemination of knowledge and making basic scientific discoveries proprietary, there is a risk of increased delays between basic discoveries and useful products, and reduced products from R&D activities overall.

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[61] Johnson, above 24.

62 Bar, T., *Defensive publications in an R&D race.* Journal of Economics & Management Strategy, 2006. **15**(1): p. 229-254.

63 Rinner, T.E., *Protecting Minor Improvements on Core Patents: Complementing Traditional Patent Protection with Strategic Disclosure, 2 J. Marshall Rev. Intell. Prop. L. 398 (2003).* UIC Review of Intellectual Property Law, 2003. **2**(2): p. 10.

64 Loise, V. and A.J. Stevens, *The Bayh-Dole Act Turns 30.* Science Translational Medicine, 2010. **2**(52): p. 52cm27-52cm27.

65 Maurer, S.M. *Promoting and disseminating knowledge: The public/private interface*. in *US National Research Council's Symposium on the Role of Scientific and Technical Data and Information in the Public Domain, Washington, DC*. 2002.

While social and private objectives are often placed on opposing sides on an ownership battle, innovation and technological progress are desired by both. Widespread knowledge dissemination promotes these outcomes, supporting the case for maintaining knowledge as public goods[66].

2.4.1 Genes

2.4.1.1 Human genome project

The development of next generation sequencing technology has altered the landscape of biomedical research and the pharmaceutical industry since it was developed in the 1990s. Many research organisations began to patent human gene codes they had sequenced and exploited the results through licensing.

In one of the most extensive efforts to publish technical information into the public domain, Merck Pharmaceuticals developed the Merck Gene Index Program (MGIP) in 1994.[68] Together with Washington University in St, Louis and the I.M.A.G.E. consortium, the MGIP was a publicly available database of expressed human gene sequences.[69] By 1998, Merck had contributed almost one million expressed sequences to the database.[70] The philosophy of the MGIP was "on the basis of a clear distinction between patentability and accessibility".[71] Merck noted that progress comes from integration of efforts of many groups and that research is performed everywhere. The company viewed the MGIP as a research tool, rather than a series of patentable inventions and stated that research tools were "pre-competitive"[72] for

66 Bar-Gill & Parchomovsky, above n 47.
68 Now Merck & Co., known as Merck Sharpe & Dohme (MSD) outside the United States and Canada.
69 Express sequence tag (EST) sequencing is a technique to identify gene transcripts through large scale partial sequencing of random cDNA clones. While it has largely been superseded by whole genome sequencing, it was instrumental in gene discovery and sequencing during the human genome project.
70 Williamson, A.R., *The Merck Gene Index project.* Drug Discov Today, 1999. **4**(3): p. 115-122.
71 Williamson.
72 Williamson.

pharmaceutical companies. The MGIP was not meant to erode the value of any privately owned database or prevent patentable inventions. On the contrary, the objective was to stimulate patentable inventions stemming from subsequent sequencing and understanding of gene function and utility.

By making these codes publicly available, it was hoped by Merck, the probability of breakthrough discoveries should increase, stimulating the industry and providing the public with useful products.

2.4.1.2 Myriad Genetics

While in the late 1990s, Merck did not think many human genes would be directly leveraged for diagnostic or therapeutic purposes, in the case of the BRCA1/2 genes, their utility as a diagnostic of inherited breast cancer risk earned Myriad Genetics a monopoly on diagnostic tests through to the 2010s.

Myriad's Comprehensive BRACAnalysis test cost $3,340USD to the patient in 2011.[73] Not only was the test costly, it relied on technology developed during the late 1990s, even though the pace of genomic sequencing in to the 21st century was fast outpacing Myriad's capabilities. The test also failed to find several important mutations in the genes, and their supplementary test (which cost a further $700USD) was poor at detecting mutations in Latin American populations. Myriad generated $353 million, 88% of its $402 million total revenue in 2011, from the BRACAnalysis test.[74]

73 Pollack, A., *Despite gene patent victory, myriad genetics faces challenges.* The New York Times, 2011.
74 Pollack.

Ownership of the BRCA1/2 sequences meant patients and clinicians were forced to use this outdated, expensive, and incomplete test. Ex-Myriad employee and genomics expert, Christopher Mason, said patents like Myriad's clashed with basic concepts in genetics and could stifle genetic research.[75]

2.4.1.3 Patentability of genetic material

The patent vs. publish debate of human gene codes was largely superseded by the *Association for Molecular Pathology v. Myriad Genetics, Inc* case which went to the United States Supreme court in 2013, in which it was decided that "a naturally occurring DNA segment is a product of nature and not patent eligible merely because it has been isolated."[76] The court ruled that synthetically created cDNA is patentable, while isolated natural DNA is not.[77] This was followed by the Australian High Court decision in 2015 to reject the patentability of isolated genes.[78] However, in New Zealand, claims to isolated, naturally occurring DNA are allowed[79]. The justification is that there is a technical step to isolating the DNA from its natural form inside the cell of an organism.

Before the Myriad patents were even overturned, and the company expected to have protection for the next 6 years through evergreening behaviour.[80,81] CEO at the time, Peter D. Meldrum stated:

75 Pollack.
76 Association for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576 (2013).
77 Cartwright-Smith, L., *Patenting genes: what does Association for Molecular Pathology v. Myriad Genetics mean for genetic testing and research?* Public Health Rep, 2014. **129**(3): p. 289-92.
78 McMahon (2019). *Gene patents and the marginalisation of ethical issues*. E.I.P.R. 2019, 41(10), 608-620
79 Sumpter, P. *Patent requirements*. Lecture given as part of 'Law and Intellectual Property for Scientists', University of Auckland 2022.
80 Pollack, above n 73.
81 "Evergreening" refers to secondary patenting activities that serve to extend patent rights beyond the normal patent lifetime in order to delay generic competition. In the pharmaceutical industry, this is commonly found as slight modifications to drug formulation or combination with other drugs.

"If I had my druthers, I would not want to go into a new market in a heavy-handed fashion, trying to enforce patents"[82]

Even though that was their exact strategy with the BRCA1/2 genes. Instead, Meldrum said, they should rely on their quicker turnaround time for testing and *"vastly superior information."* In other words, operational expertise and complementary trade secrets would have been more effective forms of protection than patenting.

2.5 Cumulative innovation

Conventional wisdom suggests that there is no obvious economic incentive to knowledge disclosure. In the past, economists attributed it to altruism, accidents, or even lack of rationality of firms who engaged in voluntary knowledge disclosure.[83] However, research shows that open knowledge disclosure has existed since at least the Industrial Revolution and is frequent within many industries. Between 1850 and 1875, open knowledge disclosure was frequent within the blast furnace industry in an industrial area of Cleveland, United Kingdom.[84] These technical disclosures led to important improvements to both the size and maximum temperature of the furnaces, which in turn led to a significant reduction in production costs.

2.5.1 Dynamic efficiency

Open knowledge disclosure among competing firms may be motivated by a desire to improve the long-term outcomes of an industry rather than the short-term monopolisation of a market. Knowledge disclosure activity aligns with the well-known game theory phenomenon that repetition of collaborative processes, which may not be sustainable at the present moment,

[82] Pollack.
83 Pénin, J., Open knowledge disclosure: An overview of the evidence and economic motivations. Journal of Economic Surveys, 2007. 21(2): p. 326-347.
[84] Allen (1983), cited in Pénin, above n 83.

become sustainable over time[85]. While patent protection is necessary for the development of some biotechnologies and products, the breadth of the patent and the scope of the ensuing monopoly can limit the development of the invention. Patents may harm inventors in cumulative innovation settings, where the development path is marked by incremental improvements by others on the original invention.[86] Broad patent protection is designed to allow the original inventor to extract value from cumulative innovations by demanding licensing fees from these later innovators. However, this rationale assumes the existence of future cumulative innovations.

In fact, broad patents can disincentivise cumulative innovation because the value that can be extracted by the second innovator is not sufficient to cover the development cost, when licenses and royalty fees are taken into account. This has been referred to as the 'hold-up problem' and contributes to the argument that patents deter innovation.[87]

The detrimental effects of the hold-up problem can be mitigated by the original inventor sacrificing some patent protection in exchange for publishing. Publication incentivises secondary inventions by allowing the second inventor greater bargaining power at the licensing-negotiation stage. This results in greater value extraction for the second inventor from the cumulative innovation.

[85] Von Hippel (1987), cited in Pénin, above n 83.
[86] Bar-Gill & Parchomovsky, above n 47.
[87] Elhauge, E. (2008). *Do patent holdup and royalty stacking lead to systematically excessive royalties?*. Journal of Competition Law and Economics, 4(3), 535-570.

While this may seem counter-intuitive to the initial inventor, promoting cumulative innovation results in higher potential rewards because there will be more sequential innovators licensing the original invention.

Increasing rewards for both original and second innovators, while improving the technical development of the industry demonstrates how restricting patent scope and encouraging publication can promote a firm's dynamic efficiency.

2.5.2 Tragedy of the anti-commons

The "tragedy of the commons" is a metaphor coined by Garret Hardin in the 1960's to explain where a publicly available, finite, resource is overused, such that it is depleted.[88] This concept has been used extensively in economics to promote privatisation as an incentive to conserve finite resources. In a mirror image to this concept, "the tragedy of the anti-commons", coined by Heller (1998), explains how increasing privatisation of previously common resources leads to underuse.[89] In biomedical research, the proliferation of fragmented and overlapping intellectual property rights has led to fewer useful products being developed for improving health. The reduction of commons knowledge in biomedical, and more broadly, life science research, leads many scholars, researchers, and product developers to view private intellectual property rights as a blockade to innovation.[90,91]

88 Hardin, G. (1968) Science 162, 1243.
89 Heller, M.A., *The tragedy of the anticommons: property in the transition from Marx to markets.* Harvard law review, 1998: p. 621-688.
90 Heller, M.A. and R.S. Eisenberg, *Can patents deter innovation? The anticommons in biomedical research.* Science, 1998. **280**(5364): p. 698-701.
91 Kingston, W. (2001). *Innovation needs patents reform*. Research Policy, 30(3), 403-423.

2.6 Patent races

The majority of literature published about the utility of defensive publishing is when they are used in patent races. A patent race (referred to sometimes as an R&D race) exists between two rival firms, a leader and a laggard, who are racing to develop an innovative technology or product. The race ends when the winning firm obtains a patent on the technology and is able to establish a monopoly. The loser of the race gains nothing, apart from the loss of their R&D investment.[92]

Patent races have been used extensively to model how competing firms behave when engaging in R&D. Research of defensive publishing in these scenarios has considered the effects of this strategy on both leading and lagging firms, generally through game-theoretic models.

A 'spoiler strategy' has been described, in which the laggard in the race publishes their invention in order to prevent or delay the leading firm obtaining a patent. [93,94]

Bar (2006) produces a model establishing that an patentable invention is *n* steps of development above the prior art. The laggard firm is patient, and will publish when the leading firm has completed *n*-1 steps. This is described as a "publish as last resort" strategy. It is stressed that while publishing sets back the competitors, it is a costly endeavour for both firms because it prolongs the race, delaying the prize and forces firms to advance innovation further than they would have needed to without publication.

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[92] Bar, above n 62.

[93] Bar.

94 Parchomovsky, G., *Publish or perish.* Michigan Law Review, 2000. **98**(4): p. 926-952.

Incentives for a leading firm to publish are more compelling. A leading firm may be motivated to disclose their position in order to force rivals to exit a race prematurely.[95] The reasoning is that laggards are unlikely to stay in the race once they know their inferior position and the development required to catch up.[96]

It has been suggested that laggards are more likely to threaten publication in order to elicit a settlement from a leading firm, given that publication confers little economic benefit to the laggard.[97] The authors develop a model to illustrate how publication by a leading firm ultimately increases the value of the innovation by driving competitors out of the race.

Briefly, the numerical example provided by the authors is as follows:[98]
Before publication, the cost to continue for both firms is 35, and the expected patent value is 100. The leader has a 60% chance of winning and the laggard has a 40% chance. After the leader makes a publication including some of the patentable material, the expected patent value for both firms drops to 70. The likelihood of winning for both firms also changes. Since the leader has disclosed some technical information, the laggard's chance of winning increases by 5% to 45%. The leader's chance of winning drops by the same amount, to 55%. The laggard now has a 45% chance of winning 70, worth 32. This is less than the cost to continue and is therefore forced out of the race.

The leader's potential payoff also changes. However, once the laggard leaves the race, the likelihood of winning becomes 100%. Now, the payoff is better than it was before the

[95] Gill, above n 41.
[96] Baker & Mezzetti, above n 42.
97 Lichtman, D., S. Baker, and K. Kraus, *Strategic disclosure in the patent system.* Vand. L. Rev., 2000. **53**: p. 2175.
[98] Lichtman, D., S. Baker, and K. Kraus.

disclosure. At the start, the net payoff was 25, which has risen to 35. See Figure 1 (below) for a pictorial representation of this model.

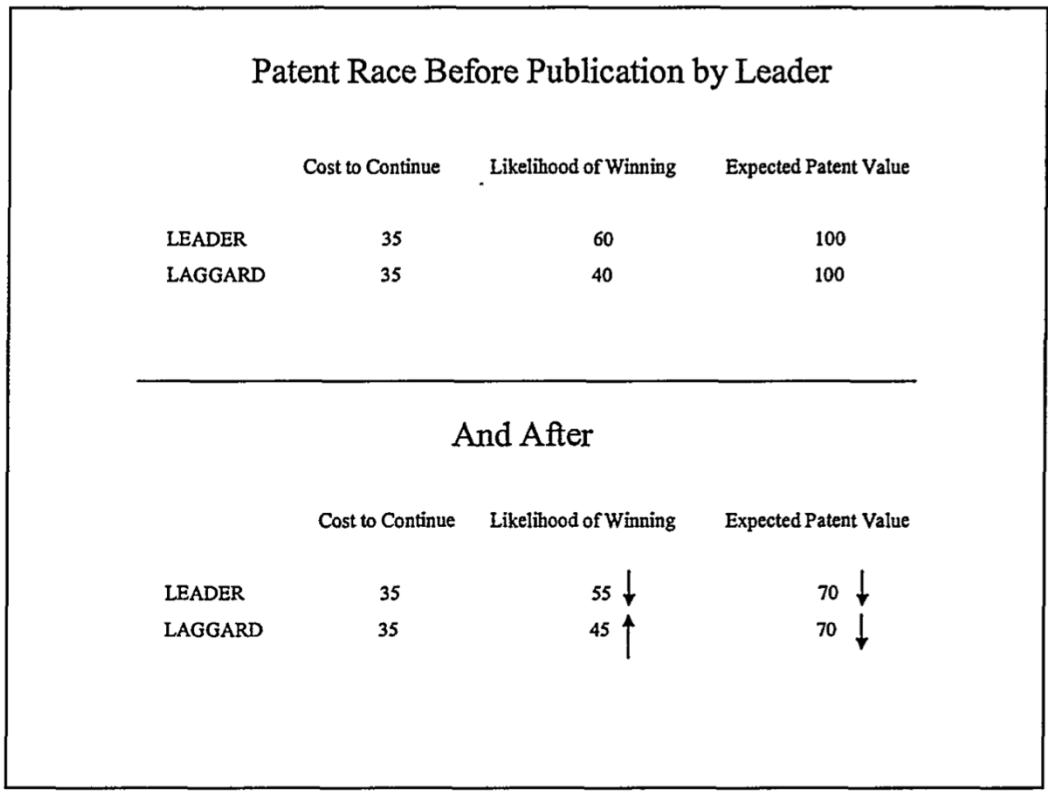

Figure 1. Strategic disclosure for the purpose of diminishing patent value. Reproduced from Lichtman, D., S. Baker, and K. Kraus, Strategic disclosure in the patent system. Vand. L. Rev., 2000. 53: p. 2175

The practicality and utility of defensive publication in patent races has been challenged by empirical research, finding that the concept was considered very theoretical and impractical to achieve. [99]

99 Henkel, J., *Defensive publishing-an empirical study.* 2008.

2.7 Research rationale

The literature on defensive publishing consists of three types of scholarly work. The first group is essays and opinion pieces that theorise on the concept, utility and implementation of defensive publishing.[100,101,102,103,104,105,106]

The second group utilise game theoretic models to illustrate how defensive publishing in specific scenarios modifies the economic and market position of firms in competitive research and development settings.[107,108,109] Many of these models have been used to show how defensive publishing can be used in a patent race.

The final, and smallest, group of works is empirical research. Some have used secondary data from patent offices and defensive disclosure databases to describe the volume and location of defensive publishing to support their proposed models.[110,111] This data, along with historically significant cases of defensive publishing, have shown that software, technology and genomics industries are particularly prone to engaging in defensive publishing.

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100 Adams, S. & Henson-Apollonio, V. (2002). *Defensive publishing: a strategy for maintaining intellectual property as public goods.* International Service for National Agriculture Research, 53, 1-8
101 Barrett, B. (2002). *Defensive use of publications in an intellectual property strategy*. Nature Biotechnology 20, 191-193
102 Boettiger, S. (2007). *Issues in IP management to support open access in collaborative innovation models*. First Monday 12(6) http://www.firstmonday.org/issues/ issue12_6/boettiger/
103 Buxbaum, P., (2001). *Publish or perish*. The Bridge, Fall 2001, 2-8
104 Colson, T. J. (2001). *Defensive publishing: protect your intellectual property*. Machine Design, 73, 72-74
105 Garnett, P. (1991). *The case for defensive disclosure*, Software Patent Institute, http://www.spi.org/defdis.htm,
106 Schaier, A. G. (2001). *Defensive publications as a patent strategy.* The Connecticut Law Tribune, June 11, 2001, http://www.carmodylaw.com/CM7articles/art_defensepub.asp
107 Lichtman, D., Baker, S. & Kraus, K. (2000). *Strategic disclosure in the patent system*. Vanderbilt Law Review, 53, 2175-2217
108 Parchomovsky, G. (2000). *Publish or perish*. Michigan Law Review, 98, 926-951
109 Rinner, T. E. (2003). *Protecting minor improvements on core patents: Complementing traditional patent protection with strategic disclosure*. John Marshall Law School Review of Intellectual Property Law 2(2), 398-422
110 Johnson, J. P. (2014). *Defensive publishing by a leading firm*. Information Economics and Policy, 28, 15-27
111 Baker, S. & Mezzetti, C. (2005). *Disclosure as a strategy in the patent race*. Journal of Law and Economics, 48, 173-194

There has only been one empirical study of defensive publishing, by Henkel (2008) . Findings from this study challenged some of the assumptions made by theorists, including the practicality of defensive publishing in a patent race. Henkel (2008) found that despite several theories predicting the utility of defensive publishing in race models, intellectual property strategists at German technology firms denied the existence of this practice, citing impracticality and limited usefulness. However, it is unclear whether the research participants in Henkel's study represent the actors described in the game theoretic models for which defensive publishing would be beneficial. Firstly, the concept was proposed to the participants as a practice that would be employed by the laggard in the race when in fact, models have demonstrated its usefulness to *leaders* of a R&D race.[112] Secondly, participants in Henkel's study reported that it is unrealistic for firms to know the position of others research and development pipelines, and therefore be unaware to the existence of a race, much less their position as a leader or laggard.

Henkel's findings importantly adjust the literature of defensive publishing in patent races to reflect the practicality and relative use of defensive publishing, and rightly temper theory with empiricism. However, it remains that theoretical models mostly predict successful defensive publishing for firms in patent races when the leader is the publisher and is aware of the existence of the race. Therefore, further empirical research to understand defensive publishing practices of leading firms aware of their participation in patent races is warranted.

[112] Henkel, above n 99. section 6.4, page 21. "We evaluate interviewees assessment…that defensive publishing may be employed by a laggard in a patent race".

3. Methodology

An interpretive phenomenological analysis (IPA) approach was taken in this research project. IPA aims to examine the lived experience of study participants, often in relation to their attitudes, beliefs, and concepts of normative behaviour.[113] While this methodology is often used in psychosocial research to understand experiences that may be complex, sensitive, or personal, it can also be used to understand views towards a particular topic of focus, where quantitative methods would not reveal aspects of complex decision-making.[114] While some research questions within this project appear to align with a quantitative research lens, for example, "how often does defensive publication in New Zealand occur?", assigning a numerical value to this question is out of the scope of this research project. This is because to understand whether a scientific publication, patent application or press release is a play at a defensive intellectual property strategy, the intent of the patent attorney or intellectual property team associated with the disclosure would have to be ascertained. While such surveys have been conducted overseas regarding patenting motives, defensive publication also encompasses motives behind other methods of disclosure.[115] The commercial sensitivity of intellectual property strategy information makes it difficult to recruit participants for this kind of data collection. Furthermore, the rich insights gathered through an IPA approach illuminate more general attitudes towards knowledge disclosure, open science and complex intellectual property management from patent attorneys.

113 Smith JA, Flowers P, Larkin M. *Interpretative phenomenological analysis: theory, method and research*. London: SAGE, 2009

114 K. Hammarberg, M. Kirkman, S. de Lacey. *Qualitative research methods: when to use them and how to judge them.* Human Reproduction, Volume 31, Issue 3, March 2016, Pages 498–501, https://doi.org/10.1093/humrep/dev334

115 Blind, Cremer & Mueller, above n 32.

Semi-structured interviews were conducted between October 2023 and January 2024 with five intellectual property experts based in New Zealand. Participants were selected based on convenience sampling. All participants were currently practising patent attorneys, working for external clients (i.e. no in-house counsel) in the life sciences sector. This broadly included biochemistry, biotechnology, food innovation, agricultural technology, and pharmaceuticals. Participants' experience as patent attorneys ranged from 8 – 25 years.

Interviews ranged from 24-35 minutes long. Interviews were recorded using Microsoft teams and Apple VoiceMemos. Interviews were not confined to the interview schedule (see Appendix) and, in accordance with the semi-structured approach, allowed for participants to offer insights in relation to both the topic of discussion and related topics. Interview recordings were transcribed manually by the researcher, immediately following one active listening of the interview recording.

Interview transcripts were provided to participants, with a two-week timeframe allowed for edits to be made, in accordance with the University of Auckland's ethics approval for this project. The transcripts were analysed using Clarke and Braun's six-phase analytical process reproduced below. [116,117]

1. Become familiar with the data.
2. Generate initial codes.
3. Search for themes.
4. Review themes.

116 Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.
117 Byrne, D. A worked example of Braun and Clarke's approach to reflexive thematic analysis. Qual Quant 56, 1391–1412 (2022). https://doi.org/10.1007/s11135-021-01182-y

5. Define themes.
6. Write-up.

Transcripts were coded, using both semantic and latent codes, according to the Braun and Clarke reflexive thematic analysis process. The reflexive process acknowledges the researcher's role in knowledge production.[118] Coding was conducted in NVivo (Release 1.7.1). After initial coding was conducted, some codes were collapsed, while others were elevated to subthemes and themes.

Themes and subthemes were generated by analysis of codes, including their frequency and the relative importance placed on them between participants. Some codes had a different valence between participants. For example, the code "using the patent system for defensive publishing". Some participants perceived the patent system to be a useful channel for defensive publishing, because it allows inventors to *"hedge their bets"*[119] – to decide the fate of the disclosure later in the application process (an example of positive valence). A patent application allows the inventor to decide to seek patent protection, let it go to publication, or withdraw the provisional application. Additionally, for participants who perceive the primary audience of defensive publication as patent examiners, the patent system is a useful channel for disclosure. Others deemed the patent system as inefficient for a defensive publication purpose, due to the 18-month delay in publication from date of filing, and the cost associated with filing a patent application (an example of negative valence). These perspectives speak to a larger attitude towards what section of a commercialisation strategy defensive publication sits within, discussed in **Theme 3**.

118 Braun, V., Clarke, V.: Reflecting on reflexive thematic analysis. Qual. Res. Sport Exerc. Health 11(4), 589–597 (2019). https://doi.org/10.1080/2159676X.2019.1628806
119 Quoted from Participant 1.

4. Themes

The themes produced here are reflective of both the participant's own attitudes towards defensive publishing and how they perceive broader attitudes toward the practice, both domestically and overseas. In many cases, due to the infrequency with which the strategy is used in Aotearoa New Zealand, the participants opined about how defensive publishing could be used rather than having actual experience with the strategy. The lack of personal experience with defensive publishing led to some participants building reasoning around Aotearoa New Zealand and international patent law logic, contextual experience of attitudes toward proprietary positions, risks associated with accidental or unwanted disclosures, and administrative burdens generated by releasing information into the public domain. Experience and exposure to defensive publishing varied between participants. Some participants had no direct experience, some routinely considered the strategy with clients but had never used it. Only one participant had used the strategy with a client, once in their career. These data are, therefore, reflective of perspectives from patent attorneys who have limited experience with using the strategy, and therefore commercial outcomes that may be associated with defensive publishing (post-publication) are not explored in depth in this data. Participants in this study largely practise within the start-up and early-stage venture ecosystem. Therefore, perspectives towards how large and multi-national corporations may approach defensive publishing as part of their intellectual property strategy were postulated by participants, in most cases, without direct experience with such companies.

4.1 Defensive publication is an uncommon intellectual property strategy.

The use of defensive publishing as part of an informed intellectual property strategy is perceived as being extremely rare in the life science sector in Aotearoa New Zealand. This is due to several factors, including the prevalence of start-up and early-stage ventures in the

ecosystem, the relative immaturity of the Aotearoa New Zealand industry, and a lack of awareness of strategic value from intellectual property professionals.

4.1.1 The life science industry is dominated by early-stage companies

The Aotearoa New Zealand life science industry is populated by research from universities, crown research institutes, university spinouts, start-up companies, and small enterprises. A 2020 survey of the biotechnology industry in Aotearoa New Zealand found that of 217 companies, 67% had fewer than 10 employees, and less than 10% had over 100 employees.[120] The same study found that 30% of companies were at pre-revenue stage or earning less than $1million (NZD) in annual revenue, and only seven companies were publicly listed. Participants noted that patent protection at early stages of life science company's lifecycle is usually important.

4.1.2 The Aotearoa New Zealand industry is immature

In addition to the early-stage nature of the Aotearoa New Zealand life sciences industry, the entire industry (including intellectual property management) was also considered immature by participants in this study.

Participant 5 quotes: *"our industry, not just patent attorney industry, but more generally, is more immature than the US, and some of the strategic nuance gets lost"*

120 BioTechNZ (2020) *2020 Aotearoa Aotearoa New ZealandBoosted by Biotech; Innovating for a Sustainable Future study.* Available at: https://www.mpi.govt.nz/dmsdocument/44077-Aotearoa-New-Zealand-boosted-by-biotech-Innovating-for-a-sustainable-future

The implication is that the small, young nature of the Aotearoa New Zealand life science industry influences intellectual property management, ultimately excluding strategies that are considered outside the normal realm of patenting.

4.2 Defensive publishing can be useful in certain scenarios

4.2.1 Where trade secrets are ineffective

Maintaining secrecy of the manufacture, composition, design, or process of an invention can be an extremely effective and economical way to protect one's intellectual property. Trade secrets do not require a filing with any authoritative body and do not have any *per se* cost associated with them. Of course, measures taken to maintain secrecy within an organisation can be costly, through security and constant vigilance of knowledge leakage.

Trade secrets are impossible to keep in some settings, especially in the life science sector. Participant 4 noted that in the pharmaceutical and nutraceutical industry, a producer is legally required to disclose the ingredients of the product, rending a compositional trade secret impossible. Small molecule pharmaceuticals can also be easily reverse-engineered, so once a product is on the market, any competitor can quickly deduce the composition and produce an identical or near-identical product. This is one of the reasons patents are so prevalent in the small molecule pharmaceutical industry. Once a product reaches the market, any secrecy around the composition is impossible.

Therefore, in situations where an exclusivity right is not sought, and where trade secrets are ineffective, a defensive publication secures the right of an inventor to make, sell and distribute their invention.

4.2.2 Innovations are prioritised for protection in large asset portfolios

Many consider that a proprietary position regarding technologies is optimal, especially in industries where other methods of intellectual property protection, such as trade secrecy, are ineffective. However, particularly in large corporations, where extensive technology pipelines are managed, not all inventions are equally prioritised to be patented.

There is a perception that large corporations with extensive budgets for intellectual property management choose to seek patent protection for all and every piece of technology in and around their pipeline. While ‘patent thicketing’ as this practice is referred to, is a common offensive strategy, sophisticated intellectual property management also includes defensive aspects. The extent to which this occurs in Aotearoa New Zealand is likely to be limited, as the relative portfolio size of companies is small. In regions with more mature industries and abundant large corporations, the practice is likely to be more common. This theme is expanded on in section 5. U.S vs. the world.

4.2.3 Small enterprises

A conflict exists between the usefulness of the defensive publishing strategy and the stage of the company's lifecycle and intellectual property function. On the one hand, as discussed above, large, sophisticated companies with extensive intellectual property units are likely to employ defensive publications as part of strategic decision-making and pipeline prioritisation. They are also more likely to appreciate the benefits of a larger pool of public domain knowledge in the industry they are working, promoting cumulative innovation. This could be because large companies spend a longer amount of time in the industry and, therefore, reap the benefits of an advancing wider industry, compared to smaller companies who are likely to exit by merger or acquisition.

On the other hand, defensive publishing can be useful in some circumstances for early-stage companies that may have a limited budget or have lagged on their intellectual property strategy (Figure 2).

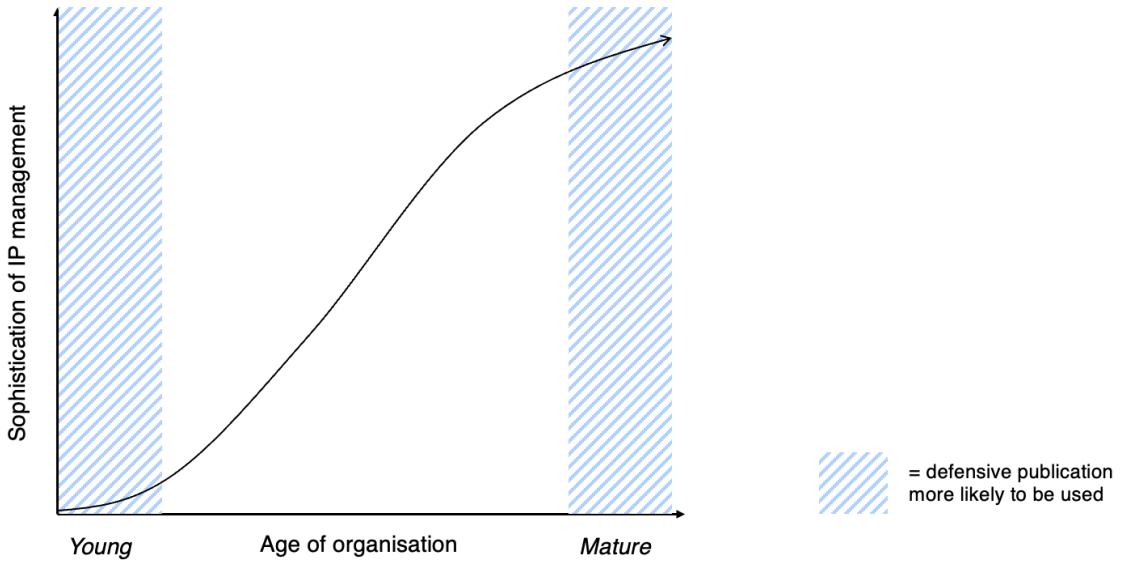

Figure 2. Defensive publications are more likely to be used by companies at either extreme of their lifecycle.

An illustrative quote is given by Participant 5:

"where there is very little [intellectual property] knowledge and they have missed the boat, and they have been in business for a year and a half, they have gone to see their lawyer who has said they should look at getting that patented. They see a patent attorney who says, 'well actually, it's a bit tricky now that you have been selling this product or service".

This scenario describes an inventor or company who has a very limited intellectual property knowledge and has therefore inadvertently missed the opportunity to gain an exclusivity right through previous disclosure. Defensive publication can help prevent another party from

patenting around the disclosures that have been made and preventing the inventor from operating.

Another scenario of an early-stage company is described by Participant 5:

"[if] you are in a situation where you have not gotten on top of your patent protection early enough, and you have been working with trade secrets and you're concerned that someone might come and patent across the top of your business. You might do a defensive publication to ensure that no one can get patents in that area."

This situation also describes an inventor or company who lacks intellectual property expertise *"[has] not gotten on top of...patent protection early enough",* and who can benefit from defensive publication by preventing a third party from gaining a monopoly across the technology.

4.3 Defensive publication is considered a small part of larger strategies

Participants considered defensive publication as a small aspect of a broader publication strategy with distinct goals, or as a part of, or possible deviation from, a patenting strategy. The perspectives on what defensive publication is associated with – publication or formal intellectual property management was associated to the context in which participants were practising. Participants who had experience in the university setting (at technology transfer offices) considered defensive publication as an aspect of the larger setting of publication, which also included distinct goals such as promotion of research and advancing academic careers. Participants practising as patent attorneys in law firms generally viewed the practice as part of a larger patenting strategy.

4.3.1 Publication strategy

Participants who practice or had experience within a university setting viewed defensive publication as a small potential part of broader publication goals within university research programs. The publication strategy is viewed as separate from an intellectual property strategy in the commercialisation of university research.

Participant 5, who has worked with a university technology transfer office, said in regard to the commercialisation approach technology transfer offices use;

"there is an R&D strategy associated with product development, an intellectual property strategy, and a publication strategy that sits along side it."

4.3.1.1 Academic goals and promotion

Publication is a very normal and important part of university research. Academics are required to publish their research as part of their employment agreements, and publication frequency, quality, and impact are a critical part of academic careers. Participant 5 noted:

"they [academic researchers] need the publications to get their numbers up so they can qualify for a promotion, and from an economic and career pathway point of view, it is very important to make those publications."

Publications are the default fate of inventions or technological discoveries in universities. It is the exception that a technology will be commercialised and patented, and so the majority of research goes to publication without a commercial intellectual property consideration.

However, in research streams that have commercialisation support, defensive angles of publication are *"frequent"*, but *"in the context of the publication strategy"*.

4.3.2 Patenting strategy

This contrasts with participants who view the practice as sitting within a broader patenting strategy. There is not a default publication strategy considered by patent attorneys working in intellectual property law firms. Therefore, any disclosures into the public domain are considered as connected to a patenting strategy. As illustrated by Participant 4:

"[defensive publishing] may have been brought up in the context of – we will file this patent application, and if it doesn't go anywhere, we are still published, and no one else can patent it."

Participants in this category (patent attorneys not working in universities) discussed the possibility of a defensive publication through the publication of the PCT filing. Participant 1 also considered the use of divisional applications as strategy that achieves some of the same goals as defensive publications, see section 4.3.2.2 Divisional applications.

4.3.2.1 Publication of the PCT application

Filing a PCT application is a common strategy to extend the amount of time allowed for an inventor to make choices about which countries to seek protection in. The PCT filing is published 18 months after the priority date by the World Intellectual Property Office (WIPO). A PCT application does not naturally proceed to a patent being granted without an applicant choosing the jurisdictions of interest and following up with the national phase. The applicant

has up to 30 months from the priority date to apply for the national phase and seek one or more patents in jurisdictions of choice. Once these 30 months have lapsed, the application is considered "abandoned" and cannot be used to seek patent protection. However, the publication of the disclosure at 18 months remains in the public domain and becomes part of the prior art. The process of letting a PCT go to publication without seeking patent protection is a recognised method of defensive publication.

4.3.2.2 Divisional applications

Participant 1 described the general approach to a divisional application strategy. While largely out of the scope of this study, it is reproduced here given the similarity in many aspects to defensive publishing.

Participant 1 described divisional applications as *"not strictly speaking a defensive publication, but it has that effect"* due to the fact that the entire specification is published (in the public domain) and therefore unable to be patented by anybody else, however the applicant still has the option of *"go[ing] back and choos[ing] different pieces of the patent specification to protect at later dates"*.

4.4 Varying definitions of defensive publication

4.4.1 Inclusion of an enabling disclosure

The primary patent requirement that publication interferes with is the novelty requirement. However, there are, of course, other requirements needed for a disclosure to be deemed patentable, including the enablement requirement. The patent bargain contains the requirement that an invention is granted a monopoly in exchange for the sharing of innovation with the public, and the public can make use and sell the invention once the term of the patent is up.

The patent specification must include sufficient information for someone who is not the inventor to be able to manufacture the invention. A patent application can be rejected on the grounds of it not being enabled within the specification.

Some participants argued that a defensive publication could only be defined as such if it included all the aspects required of a patent. One such being, an enabling disclosure. The nuances of the detail that is required to destroy the patentability of an invention are complicated by the jurisdiction where the conflict takes place.

4.4.2 Where patentability is uncertain

Some participants acknowledged that a defensive publication could be used where the patentability of an invention is uncertain. By providing sufficient evidence in the prior art that the invention is not novel, the defensive publication potentially prevents a 'bad patent' being granted in the future on other grounds such as sufficient inventive step. The publisher or their attorneys may not consider the invention patentable, but that is not to rule out the possibility of a patent ever being granted in the future to someone else. The existence and ever more frequent granting of bad patents has been extensively covered in the literature.[121]

Other participants deemed a publication only defensive if it includes and achieves all requirements for patentability at the time of publication.

Participant 3 quotes that: *"I only regard defensive publications as being something that's been assessed to be patentable, but you decide not to pursue any patent protection, you decide to publish it."*

[121] Johnson, above n 24.

And questioned the relative “defensiveness” of publications in the genetic sector at the time of publication. The patentability of genetic material has changed somewhat considerably over the last 20 years, and many examples of defensive publication in the life sciences draw on genetic research. Therefore, using the criterion posed by Participant 3, it is fair to say some publications of genetic research would have been defensive at one time, but not at another. This also draws into the question of whether strategic choices about intellectual property management are completely reliant on current patent law or for intellectual property assets with a long lifetime; there is consideration of a possible change in legislation affecting protection.

For a hypothetical example, Company A’s technology is protected by trade secrets, and is deemed unpatentable for the first half of its lifetime. A change in legislation causes the technology to become eligible for patent protection. A third party develops and patents the technology independently of Company A, who is now excluded from using, making or selling their invention.

Company A could have prevented such exclusion from the market by making a defensive publication before the onset of patentability. At the time of publication, however, the invention was not patentable, and so does not meet the definition offered by Participant 3.

4.4.3 Proposal of new definition

I propose a separate definition for this scenario of defensive publishing, where the defensive nature of the publication is contingent on a change in patent law or interpretation and application of the law by patent offices. This is separate from normal prior art, as it is made

with the precise goal of preventing a (future) patent. I propose this practice to be called "**prospective defensive publication**" and has not yet specifically been defined in the literature.

4.4.4 Secret prior use

In any scenario where trade secrets are used, there is a possibility that a third party could *"patent across the top of your business"* (quoted from Participant 5) and exclude you from the market. In this case, prior use can be argued as a mitigation of patentability. However, as noted by Participant 5, there are complications surrounding secret prior use, i.e. when used under trade secrecy, and whether this type of prior use interferes with patentability is not completely reliable.

4.5 United States vs the world

Patent law was largely internationally harmonised through the TRIPS agreement in 1994, establishing common standards and rules that member countries must adhere to regarding the protection and enforcement of patents. This introduced international prior art, and set out minimum standards and procedures for examining and granting patents in member states.

However, each member state maintains its own patent law and there are variations in how patents applications proceed to publication, examination and granting, as well as variation in the standards required for patent protection.

The United States is a particular case; as one of the largest life science industries and largest producer of patents, it also has some peculiarities, often considered leniencies, in how patent law is applied compared to other comparable member states. Additionally, given the number of large corporations in the industry and their extensive intellectual property portfolios, asset

management may be more nuanced than in other regions. Participants in this study consistently cited the United States as different from other jurisdictions, and that defensive publishing was more likely to occur there.

4.5.1 Jurisdiction affects definition

Whether or not an invention is patentable in any jurisdiction depends on the stringency of the patent examiner, and what is considered fulfilling of the patent requirements in one jurisdiction may not be the same for another. Participants in this study considered that the novelty requirement, and inventive step required to gain patent protection in the United States was considerably lower, than in comparable member states such as the European Union. For example, to quote Participant 1 *"In the US… if you want to get a patent granted, they are more likely to grant it with not much evidence, and not being particularly inventive."*

Participant 3 only considered a disclosure only a defensive publication if it fulfilled patentability requirements. *"If I was going to be particularly dogmatic about it, I would say a defensive publication is only a publication of something that's been assessed to be patentable without pursuing an application for protection."*

Given the variability in patent requirements between jurisdictions, there may be some in-built variation in the definition of defensive publication, particularly between the United States and other TRIPS member states.

4.5.3 Grace periods

One peculiarity of United States patent law is the extensive grace period allowed after publication for the author to seek patent protection. 30 countries have a grace period built into their patent law, however in most cases these have no material effect, and none are so

meaningful as in the United States.[122] In most other jurisdictions, publication into the public domain voids patentability from the date of publication for both author and any third party. In the United States however, there is a 12-month period where the author of the disclosure can file a patent without the publication voiding novelty. This variation affects how publication interferes with the novelty requirement in the United States compared to other member states. For example, disclosing an invention in the United States may allow a patent to be granted to the inventor up to 12 months later, but a European patent application for the same invention will be rejected on grounds of lack of novelty.

Given that large United States corporations are often also multinational, they must consider international patent law as part of their intellectual property management. One study considering views of grace periods between the United States and the United Kingdom found that grace periods are not relied on by technology corporations in the United States and are more of a safety net in the situation of accidental disclosure.[123]

The existence and variation in grace periods alters the definition of a novelty destroying disclosure in the United States compared to most of the rest of TRIPS member states. In the United States, a defensive publication retains its mechanism to prevent competitors from gaining a patent; however, does not destroy the possibility of the author seeking protection later within the grace period.

[122] Franzoni, C., & Scellato, G. (2010). The grace period in international patent law and its effect on the timing of disclosure. Research policy, 39(2), 200-213.

123 A quote from a participant in SPAFutureThinking for the Intellectual Property Office (UK) (2015) "*Grace period a UK US Study Report 2015"* ISBN: 978-1-910790-13-7. [Accessed at: https://assets.publishing.service.gov.uk/media/5a81b490e5274a2e87dbf125/Patent-Grace-Periods.pdf]
"a Grace Period it's only a safety net. It is rarely used. No-one relies on the Grace Period here in the US. Nobody says, oh I don't have the money to file a patent application right now, let's just disclose ...".

Gracing of disclosures is one significant reason why defensive publications may be more attractive to United States inventors and patent attorneys. They offer the benefit to an inventor of preventing a competitor from gaining an exclusivity right while retaining the possibility for themselves. One report suggests that grace periods are considered most useful by academic inventors, who are more likely to both make accidental disclosures, and benefit from the promotional aspect of publication, such as attracting research partners or investment.[124] Participants also suggested that defensive publications are more likely to occur in the United States due to the size, number of large corporations, and maturity of the life science industry.

4.6 Defensive publishing is seen as both a philosophical and commercial strategy

Purposeful disclosure of intellectual property assets was seen by participants as having both philosophical and commercial components. The philosophy of knowledge dissemination, a rich information commons and concepts such as open science are more important to some inventors and companies than others. Similarly, the commercial aspects of intellectual property are prioritised by others, such as the relative market position of one's company compared to competitors. In most cases, there is a consideration of both philosophical and commercial drivers when decisions are made about whether to publish a defensive disclosure.

4.6.1 Philosophical

4.6.1.1 Attitudes towards proprietary positions

Participants acknowledged that companies have different attitudes towards proprietary positions of their intellectual property assets. These attitudes, or values, are set by the directors

[124] SPAFutureThinking for the Intellectual Property Office, above n 123.

or even charter levels of the company. Such values drive the high-level decision-making of intellectual property asset management.

4.6.1.2 Attitudes towards monopolies

Generally, entities such as governments, universities, and crown research institutions are theoretically opposed to the monopolisation of markets. There exists a large school of thought that research that is publicly funded should be available to the funders of that research i.e. the taxpayer i.e. the general public. Or if the research is commercialised, that intellectual property should be held in government patents.

The privatisation of publicly funded research has existed since the Bayh-Dole Act in the United States was passed in 1980. Similar pieces of legislation around the world soon followed. This Act is partially credited for the biotechnology boom in the 1980s and 1990s and resulted in many innovative medicinal products reaching the hands of doctors and patients.[125] While this legislation is acknowledged as revolutionising both the biotechnology and pharmaceutical industries, and biomedical research at universities, private ownership of publicly funded research remains a topic of controversy both in Aotearoa New Zealand and abroad.[126] Participants in this study generalised inventors working in or around government research institutions as naturally less likely to support knowledge assets being held under exclusivity rights.

[125] Mowery, D. C., Nelson, R. R., Sampat, B. N., & Ziedonis, A. A. (2001). *The growth of patenting and licensing by US universities: an assessment of the effects of the Bayh–Dole act of 1980*. Research policy, 30(1), 99-119.

[126] Thursby, J. G., & Thursby, M. C. (2011). *Has the Bayh-Dole act compromised basic research?*. Research Policy, 40(8), 1077-1083.

4.6.1.3 Some industries are prone to defensive publication

Some sectors of research are more prone to emphasise the importance of public domain knowledge. Historically, software research has championed the philosophy through the open-source movement, where code is uploaded to public databases on the internet for free public use. When second-generation techniques of DNA reading became available, and vast amounts of genetic information were being produced across the globe for the first time, researchers made organised efforts to generate public, or quasi-public repositories for this information. In both cases, the information is vast, complex, and is most powerful when combined and compared in large data sets. There have also been movements in the creative industries, such as copy-left, where instead of normal copyright protection, creators choose to share their works through limited, although usually free, licenses.[127]

In addition to industries where pooling of research and collaboration is crucial to advancing innovation, some industries are also prone to knowledge disclosure due to public morality and cultural considerations of knowledge governance. Genetic research in Aotearoa New Zealand is a particular example of this, given that genes are taonga. Tikanga Māori considers that genetic material is not owned by any one individual that carries the genetic sequence, rather their mokopuna (grandchildren and descendants), who will eventually inherit the material. This te ao Māori view conflicts with current patent law in Aotearoa New Zealand, which currently allows the patenting, and therefore transfer of ownership of genetic material. Intellectual property rights and the privatisation of indigenous knowledge goods (including genes) has been discussed in the public forum in New Zealand, particularly through the Wai262 claim of the

127 One of the most successful and popular examples of a copy-left platform is Creative Commons, where creators provide limited, but free, licences for designs, illustrations, and other visual works. The boundaries of the licences are generally that the work not be altered or used for commercial purposes. See: https://creativecommons.org/share-your-work/cclicenses/

Waitangi tribunal.[128,129,130] South Island iwi Ngāi Tahu in a submission to the international review committee on genetic manipulation (RCGM) wrote:

"The intellectual property approach adopts the inappropriate application of the term property to traditional resources of indigenous communities. This concept of ownership and the ability to transfer ownership which are fundamentally common law notions of property and are foreign and incomprehensible to indigenous peoples such as iwi (RCGM A2:193)."

Without reform, tensions regarding public disclosure and private ownership of genetic material and other biotechnological products considered taonga are likely to continue in Aotearoa New Zealand's patent legislation.

4.6.2 Commercial

In addition to the acknowledgement that a company's decision to make a defensive publication is often influenced by philosophical perspectives regarding open knowledge, there are also significant commercial drivers of this strategy.

Similarly to an exclusivity right, which provides the owner of the patent both the right to sell a product, and the right to exclude others from the market, a defensive publication has both egocentric (regarding oneself) and allocentric (regarding others) commercial elements. In the present study, the egocentric element is defined as how the publication affects the inventor's right to operate in their chosen market. The allocentric element is defined as using the strategy

128 Hutchings, J. (2007) Is Biotechnology an Appropriate Development Path for Maori? *Pacific Genes and Life Patents: Pacific Indigenous Experiences & Analysis of the Commodification & Ownership of Life*. Available at: https://calloftheearth.files.wordefensive publishing ress.com/2009/07/coe-publication-final.pdf
129 Sullivan, B., & Tuffery-Huria, L. (2014). New Zealand: Wai 262 report and after p. 403-410.
130 Ko Aotearoa tēnei: a report into claims concerning Aotearoa New Zealandlaw and policy affecting Māori culture and identity. Te taumata tuatahi. (Waitangi Tribunal report). Patents: p. 79

to affect the operations of a competitor. In practice, decisions about these elements of a commercial strategy are not made in isolation, but one may be prioritised over the other in any given scenario.

4.6.2.1 Egocentric

4.6.2.1a Protecting own position

Defensive publication can protect an inventor's ability to make, use or sell a product without the threat of an exclusivity right being granted to a third party, and subsequent threat of suing on grounds of patent infringement. The use of defensive publication for the purpose of maintaining freedom to operate in the absence of an exclusivity right was described by participants in this study.

Participant 2 described a scenario where a publication was used for this purpose:

"[defensive] publication play to try and prevent third parties from patenting, essentially, so that when they would have, you know, it was out in the public domain, so they had freedom to operate"

If an inventor is not in a position to gain patent protection for their invention, a defensive publication can protect their right to operate in the face of competitors who may seek a monopoly.

4.6.2.1b Maintaining room to move around technology

In a related but separate play, inventors may make a defensive publication to prevent being ring-fenced by competition. Publishing *around* a core technology or piece of intellectual

property prevents third parties from gaining patents that are too close to the technology, curtailing the inventor's room to operate (Figure 3). In practice, this may look like an inventor protecting an active pharmaceutical ingredient (API) through a composition of matter patent, and choosing to make publications disclosing delivery formats, varying formulations, or production processes for the drug. This way, the inventor retains their key intellectual property asset and creates room to make and sell their product without competitors creating innovation or market blocks through patents of their own.

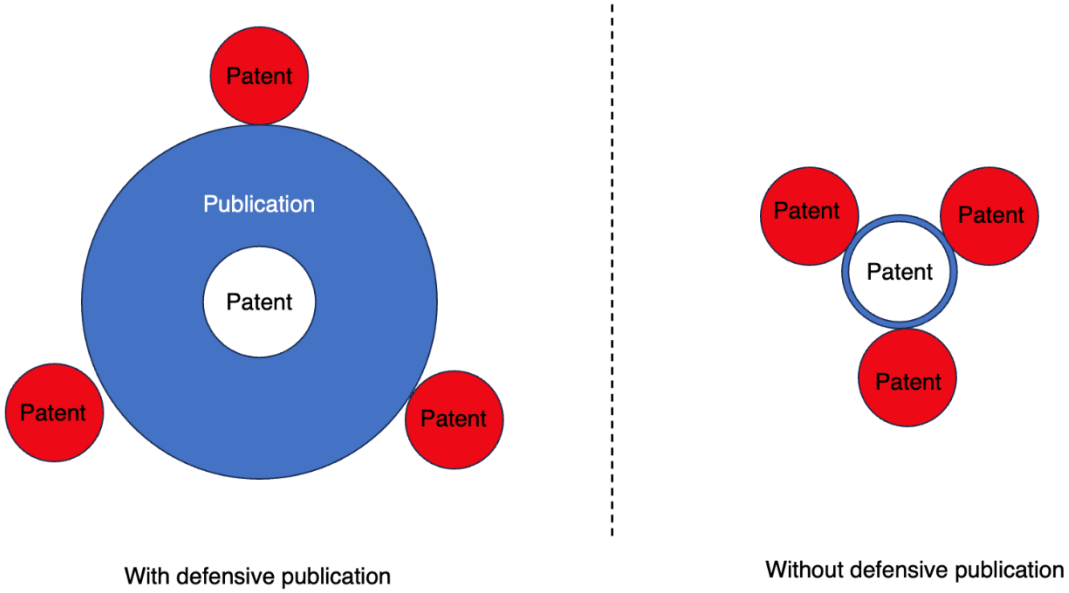

Figure 3. A defensive publication creates a moat around a core patent (left). Competitor patents (red circles) close in on a patent (right) without a defensive publication.

This strategy is routinely employed as part of a patent application. A narrow set of claims will be put forward for protection, but a much broader description of the invention and variations upon it will be published as part of the patent specification. Some participants considered such inclusions in the specification as a type of defensive publication, because it creates prior art and prevents others from patenting closely around the invention. Others did not categorise this practice as defensive publication *per se* and viewed it as a normal part of patent drafting. This

is closely related to the practice of divisional applications as described in *Theme 4.3.2.2 Divisional applications.*

4.6.2.2 Allocentric

Like most strategic business choices that are made, there is a consideration of how the decision will affect both a company's own position and the position of its competitors. In some cases, negatively impacting a competitor's position is the desired primary outcome of defensive publication. This may be through distraction, confusion, or "poisoning the well" of intellectual property assets. Most companies or their patent attorneys conduct surveillance activities to gauge the progress, direction, and priorities of their competitors. This helps to understand their own position in the market, potential new products, or services they will have to compete with, and any gaps that may arise from changes in strategic direction.

To prevent competitors from having comprehensive or accurate intelligence regarding a company's own operations, public disclosures may be made to distract or confuse third parties about their real strategic positions. It may be entirely distraction, as in publications made that do not relate to the company's direction, or confusion, where conflicting or complex disclosures make it difficult to tell where the companies priorities lie. Publications in this category can help a company maintain privacy, and potentially encourage competitors to make poorer decisions based on these deceiving disclosures.

Another reason to make defensive publications in an allocentric competitive play is to "poison the well" of an innovation area. As discussed throughout this thesis, a defensive publication prevents any subsequent patent being able to be granted on the invention. A company may make a defensive publication within the area of their competitors to prevent them gaining

patent protection (Figure 4). This strategy is offensive and serves to set back or exclude a competitor from certain aspects of the market.

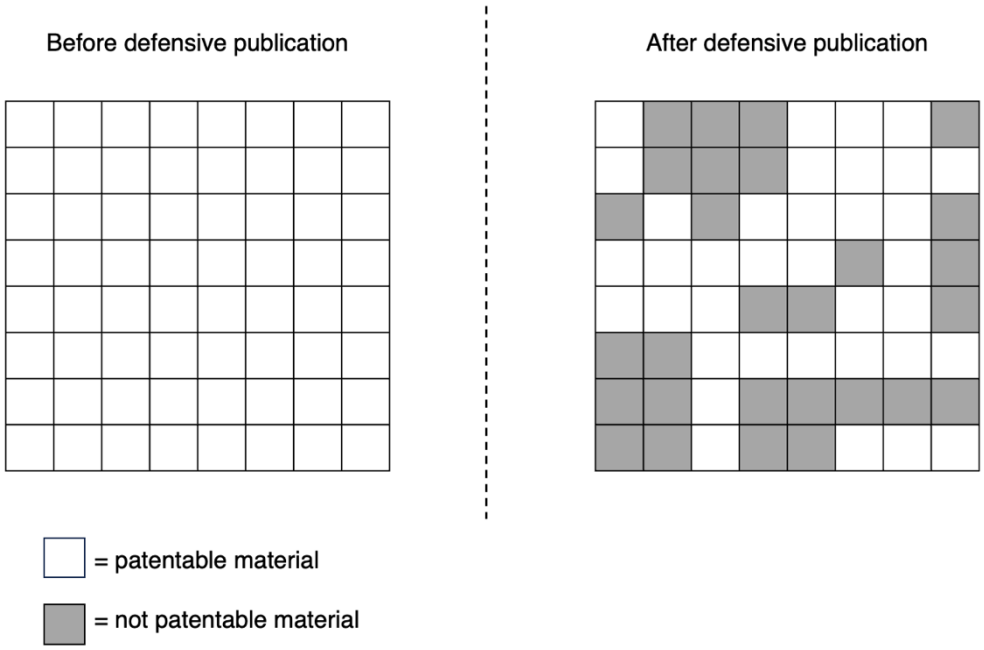

Figure 4. Poisoning the well of patentable material. A defensive publication reduces the opportunities to patent aspects of a technology.

Participant 1 described the existence of this practice within the field of health technologies.

"if [a company] decides to not go down that route, they would rather that no one else can go down that route either…compromising someone else's ability to gain rights on something. Simply because you've decided to not go down that route."

5. Discussion

The prevailing sentiment of participants in this study is captured by a statement from Participant 1, who questions the relevance of defensive publication in the context of a company's growth phase: *"What is the point of defensive publication when you are building a portfolio?"*.

Aotearoa New Zealand is filled with start-ups and small enterprises, which are less likely to have a sophisticated intellectual property function, as their intellectual property asset portfolio is small. In addition, they often operate with limited resources. The additional administrative requirements needed to keep track of defensive publications may be burdensome. However, Participant 5 notes that defensive publication may be equally as useful to a large multinational corporation as a small, immature company.

Different channels to make a publication available to the public may be used for different reasons (Table 1).

Table 1. Pros and cons of different methods of defensive publication

Channel	Pros	Cons
Patent system	• Increases options for IP management • Patent examiners are likely to be aware of the disclosure • Date of disclosure confirmed	• High cost • Delayed publication
Scientific journal	• Can serve other publication goals • Improves company credibility • Date of disclosure confirmed • Formal record keeping is external	• Delayed /uncontrollable publication date • Some associated cost • Limits to what can be included
Defensive publishing database	• Low cost • Immediate publication • Date of disclosure confirmed	• Limited exposure to intended audience
Informal method – website, conference, press release	• Can serve promotional aspects of publication strategy • Low cost	• Date of disclosure not confirmed • No formal record keeping of disclosure

There is a perception among some practitioners that defensive publication is more of a philosophical stance than a pragmatic commercial strategy. The notion that releasing a disclosure of an invention into the public domain is a "gift", rather than having a commercial benefit to the company. [131]

In summary, the limited adoption of defensive publication in Aotearoa New Zealand can be attributed to a combination of factors, including the prevailing emphasis on portfolio building, an immature industry landscape, a lack of strategic sophistication, the administrative burden associated with defensive publishing, and a perception among patent attorneys that it is more of a philosophical stance rather than a commercial strategy. Addressing these factors may contribute to a more nuanced approach to intellectual property management, accommodating defensive publication as a viable option in certain scenarios.

131 Quoted from Participant 2 " just basically gifting the information to the world" [in reference to using defensive publication as an intellectual property strategy].

6. Conclusion

The use of defensive publication as an intellectual property strategy in the Aotearoa New Zealand life science industry is rare. Use is limited by the need to protect inventions by early-stage companies, who have small (or n=1) asset portfolios, with little other capital assets. Its use is further limited by the attitudes of practising patent attorneys in the industry, who may be unaware of the commercial value of disclosing aspects of an invention into the public domain. Patent law in Aotearoa New Zealand also influences the use of the strategy, with no meaningful grace periods allowed for inventors to file patent applications for previously published disclosures. The grace period in the United States, along with more lenient patent requirements and a larger, mature life science and patent attorney industry, likely influences the use and research of the strategy in the region. Despite this, small companies, including in Aotearoa New Zealand, may benefit from employing defensive publishing in scenarios where resources for intellectual property are limited, trade secrets are ineffective, and freedom to operate must be maintained. A proposal for future research is a quantitative investigation of the use of defensive publishing in New Zealand, through an industry-wide survey of patent attorneys practising in the sector to understand the frequency and conditions of this strategy. Finally, the proposal of an additional definition of defensive publication – "prospective defensive publication", in scenarios where a disclosure is made for a future iteration of patent legislation, is submitted to the literature.

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Appendix

Semi-structured interview schedule

1. Have you ever used defensive publishing as an IP strategy for a client?

2. If yes, how often does this occur?

3. Through what channels are the inventions published?
- Scientific journals, patent system, press releases

4. Have you heard of/used defensive publishing databases? Are these used in Aotearoa New Zealand? (ResearchDisclosure.com, IP.com)

5. For what kinds of inventions?
- Platform technologies, minor modifications to a drug formulation, inventions where the patentability is uncertain?

6. Are some types or sizes of companies more/less likely to use this strategy?
- Start-ups/SMEs/MNCs?

7. Are there specific conditions under which you would advise defensive publishing as an intellectual property strategy?
- Limited intellectual property budget of the inventor? Patent races?