Disarming the Patent Wars

Intellectual property law in the US has noble intentions, "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.” Patent in particular was designed to protect and incentivize the inventor to innovate. However, through decades of evidence, particularly as observed in software and digital technology, it is becoming clear that patent protection serves more to protect entrenched monopolies than incentivize innovation. Patent is not a particularly powerful incentive to innovate; in fact over time it increasingly functions inversely to this goal. More deeply, patent is intrinsically incompatible with the nature of technology. The modular nature of technology sees patent gridlock becoming an inevitable fixture of any sufficiently advanced technological landscape.

Patent seems intrinsically unable to scale with the complexity that modern innovation comprises. Simplistic robotics or mobile devices are comprised of hundreds of modules that represent a web of thousands of patents. In addition, software patents end up functioning to patent entire design concepts, regardless of specific implementation, making infringement inevitable. Trying to innovate in the modern landscape is fraught with potential pitfalls and mines. Innovators are currently faced with the complex task of trying to identify every single patent that could remotely apply to their product or conversely, charge ahead and hope for the best.

Patent is currently functioning inversely to its stated goal of promoting innovation, and for this reason alone, the patent process should be abolished altogether. While seemingly extreme, this is actually the most realistic approach. All attempts to create a “perfect” patent system will trend toward the problems we are currently facing.

Patent Systems Trend One Way

A study conducted by Michele Boldrin and David K. Levine, researchers at the Federal Reserve Bank of St. Louis, argues for the abolition of patents based on empirical and theoretical evidence of patent's failure to achieve its stated goal of increasing innovation. "The case against patents can be summarized briefly: there is no empirical evidence that [patents] serve to increase innovation and productivity, unless the latter is identified with the number of patents awarded – which, as evidence shows, has no correlation with measured productivity." (Boldrin & Levine, 1) Moreover, the authors identify a trend from weak patent legislation to strong legislation as over time entrenched monopolies modify the system to reflect their desires. "Both theoretically and empirically, the political economy of government operated patent systems indicates that weak legislation will generally evolve into a strong protection and that the political demand for stronger patent protection comes from old and stagnant industries and firms, not from new and innovative ones." (Boldrin & Levine, 1)

This is a bold assertion, but one that is quite logical when considered against human cognitive biases. As Boldrin and Levine point out, the positive impact of patents is a straightforward partial equilibrium effect of increasing profits for the successful innovator; however, the negative impact is a subtler general equilibrium effect that reduces all other actors' ability to compete and simultaneously increases the incentive for wasteful lobbying. Simply stated, the value of patent is more obvious to its observers than are the detriments.

Looking at the history of innovation, one sees that inventors exchange ideas freely as a matter of course, and then attempt to gain secrecy in the final stages of an innovation when the inventors hope to corner the market through patent. "A good case in point is that of the Wright brothers, who made a modest improvement in existing flight technology, which they kept secret

until they could lock it down on patents, then used their patents both to monopolize the U.S. market and to prevent innovation for nearly 20 years." (Boldrin & Levine, 3) This stifling of early airplane innovation was not just a problem of a single aggressive patent holder, it was a problem of what Michael Heller calls gridlock. In "Gridlock Economy," Michael Heller highlights the problem of too many owners leading to underuse, or a "tragedy of the anticommons." Basically, when there are too many fragmented rights holders, collective action breaks down and the resource becomes underused; everyone can say no but no one can say yes.

After the Wright brothers initial design, "Glenn Curtiss and other inventors improved on the design with better controls and engines. Everyone owned a piece of the plane, but they could not agree on licensing terms." (Heller) Due to suits from the Wright brothers, "In 1913, a court ordered the then-dominant Curtiss Company to stop making planes. Looking at the mess the Federal Court of Claims reflected that 'prior to January 1917, the development of the aircraft industry in the United States was seriously retarded by the existence of a chaotic situation concerning the validity and ownership of important aeronautical patents." (Heller) All the while the non-gridlocked European aeronautics industry continued producing better airplane designs. With the onset of World War I came the deployment of warplanes necessitating action by the US Congress. In 1917, Congress stepped into the market forcing a patent pool between Wright Brothers and Curtiss Company creating the Manufacturers Aircraft Association; three weeks later the US officially entered the war. (Heller)

This problem of gridlock has only deepened. Gridlock continues to hinder the innovation possibilities of new startups, particularly in the software arena. "Unlike patents for new drug formulas, patents on software often effectively grant ownership of concepts, rather than tangible creations. Today, the patent office routinely approves patents that describe vague algorithms or

business methods." (Duhigg & Lohr) Software is particularly nested with even simple mobile phone apps containing thousands of subroutines calling one another. As well, myraid software packages often achieve the same ends using very different coded means. "'There are hundreds of ways to write the same computer program," said James Bessen, a legal expert at Harvard. And so patent applications often try to encompass every potential aspect of a new technology. […] 'the borders are fuzzy, so it's really easy to accuse others of trespassing on your ideas.'" (Duhigg & Lohr)

This means that essential features of software and hardware design are patented in broad terms ensuring that anyone wishing to enter the market will either be blocked or required to license numerous separate patents just to make an archetypal device. "Patents for software and some kinds of electronics, particularly smartphones, are now so problematic that they contribute to a so-called patent tax that adds as much as 20 percent to companies' research and development costs, according to a study conducted […] by two Boston University professors." (Duhigg & Lohr) Valuable research and development money is utilized for engineering around core patents, or just licensing them outright. The broad claims of many patent holders ensure that any latecomers to the market will quickly be enveloped in a patent thicket.

Congress has been locked in political gridlock over how to address these issues. "The last attempt, the America Invents Act, [passed in 2011], achieved mostly administrative fixes, like making it easier for outsiders to challenge a patent's validity." (Duhigg & Lohr) This particular law did not address broad claims or strengthen standards for originality. The new law did make one fundamental change. Previously the US patent system had operated on a "first to invent" principle, where whoever made the first prototype got protection. Under the America Invents

Act, ownership is now awarded to whoever submits the first application, or "first to file." (Duhigg & Lohr)

This shift makes life particularly difficult for small entrepreneurs and innovators, the very people patent is supposed to incentivize. "Large companies with battalions of lawyers can file thousands of pre-emptive patent applications in emerging industries. Start-ups, lacking similar resources, will find themselves easy prey once their products show promise." (Duhigg & Lohr) Moreover large companies have the capital to essentially wear the patent office down even when they are rejected. Companies like Apple have engaged in this practice, changing small phrases or words of rejected patents then re-submitting. "About 70 percent of patent applications are eventually approved after an applicant has altered claims, tinkered with language or worn down the patent examiners." (Duhigg & Lohr) This adds up to a system inherently biased against small upstarts. All the while, large corporations buy up swaths of patents in defensive measures, while patent trolls use patents to extract rents from individuals engaging in real innovation.

Software Ate the World

New and useful improvements to software must be built on top of other software, not just conceptually but also literally. Since the hardware environment of microprocessors is standardized and programming languages are standardized, there are simply certain tasks, calls and routines necessary for higher function that will always be the same no matter who writes them or how much they try to avoid infringing on patent.

Eric S. Maskin, Professor of Economics at Harvard sums up the issue succinctly:

> *"Specifically, in the software industry, progress is highly sequential: progress is typically made through a large number of small steps, each building on the previous ones. If one of those steps is patentable, then the patent holder can effectively block (or at least slow down) subsequent progress by setting high license fees. Moreover, like any other monopolist, it has the incentive to set such fees. Thus, in an industry with highly*

> *sequential innovation, it may be better for society to scrap patents altogether than try to tighten them."*

It would be easy to dismiss software as a marginal part of the global economy and a unique case. "Huge as information industries have become, they're still a sideshow in the world economy. To put a ballpark figure on it, the digital economy, broadly defined, represents $20 trillion of revenues, according to Citibank and Oxford Economics. The economy beyond the Web, by the same estimate, is about $130 trillion." (Anderson) However, software is becoming the mediating force for the majority of design endeavors in the economy. Not only is design a software mediated affair, hardware itself is mostly software these days, "with products becoming little more than intellectual property embodied in commodity materials, whether it's the code that drives the off-the-shelf chips in gadgets or the 3-D design files that drive manufacturing." (Anderson) There is a broader conceptual shift afoot in the integration of software into all technologies, from cars to factories. Across industry and economy software finds itself entwined with hardware in the form of digital technologies. As more and more objects are given embedded networked computers, the scaling issues of software patent will manifest across the economy of atoms.

There is an emerging and profound potential to democratize the development and production of material goods through desktop fabrication. "Just as the Web democratized innovation in bits, a new class of 'rapid prototyping' technologies, from 3-D printers to laser cutters, is democratizing innovation in atoms."(Anderson) 3-D printing in particular represents a transformative potential for innovation. 3-D printing, or Additive Manufacturing, is a blanket term for a series of procedural mechanisms designed to turn Computer-Aided Design (CAD) files into solid objects using layers of material. 3-D printing has existed in industrial settings since the 80s, but the past few years have seen it move into the consumer space in the form of

affordable small desktop 3-D printers. This movement is democratizing the ability to rapidly prototype and build sophisticated physical world inventions. Similarly to how desktop publishing ushered in an era of innovative user content, 3-D printing is ushering in bottom-up innovation in manufacturing and product design. Some printers use technology very similar to 2-D inkjet printers to extrude layers of material–often plastics–in an additive way one on top of another. When repeated this process builds up intricate 3-D components. This technology combined with the already powerful global entrepreneurship opportunities of the Internet could usher in an era of unprecedented creativity.

Yet this transformative technology is currently locked in a patent gridlock scenario that sees consumers able to access only the most rudimentary printer designs while large commercial players continue to dominate. Current consumer 3-D printers use cheaper plastic achieving relatively low resolution from mostly single color/material print heads; they employ a process called fused deposition modeling (FDM) that uses melted plastic extruded from a print head. At the end of January 2014, a series of patents on selective laser sintering (SLS) expired, bringing a core technological approach into the possibility space for consumer 3D printers. “SLS takes in powdered material, rather than plastic filament and uses a laser to bind it and create a solid structure. SLS printers can work using metal, glass, and ceramic materials. They can make things that are ready for sale, of the sort that to make today you’d need a really expensive printer for.” (Robinson) When these patents on SLS expired, it seemed that the era of professional quality 3-D printing for the masses would arrive shortly. The last time a major patent on FDM technology expired in 2009, it expedited the first waves of consumer 3-D printing in an outward rush. “‘As soon as the patents expired, everything exploded and went open-source, and now there are hundreds of FDM machines on the market. An FDM machine was $14,000 five years ago and

now it's $300,' Shapeways' Duann Scott said last year, talking about the run on the market begun with the FDM patent expiring in 2009." (Robinson) With SLS now on the table the potential for innovation should be massive! Indeed the tech press was eagerly anticipating the expiration of these SLS patents in 2013 claiming they would lead to another quick upswing in capability and decrease in price. Except nothing has happened. The problem is one of gridlock. The "SLS is just one piece of the patent bank that the 3D-printing giants like Stratasys and 3D Systems have locked down, many of which were only filed recently. There're so many 3D-printing patents keeping technology siloed inside the bigger companies that the Electronic Frontier Foundation has started its own effort to free the market." (Robinson) This is not to say that the 3-D printing patent thicket is the sole culprit, SLS is a generally more complicated technology to deploy. Yet pure engineering challenges are rapidly solvable through application of clever approaches, but when patent is in the mix things grind to a halt. Patent terms take finite time to expire and have no opportunities for clever technical solution other than licensing or innovating around, which adds engineering complexity beyond what would be necessary in the patents' absence.

Destroy or Reform

Do we truly need to abandon patent rights, or is balance achievable? On principle it seems advisable to try. Humans can surely fix a system designed by human governance. Indeed, despite giving us the language to describe gridlock and underuse and demonstrating the detriments of over-ownership, Heller continues to advocate for the existence of the patent system. Falling on the side of people who believe that it does incentivize innovation. Heller advocates for using his framework of the spectrum of property–from commons to anticommons–to craft a system of protection that encompasses the sweet spot of property without collapsing

into gridlock and underuse. “Our goal should be, as it always is with patents, to grant the least protection possible without destroying robust incentives for private investment and innovation. In making this trade-off, we should stay alert to potential tragedies of the anticommons, even though their costs are and will remain hard to pin down.”(Heller)

This seems fine from a rhetorical perspective, but Heller is essentially arguing for what so many have already argued for: a perfect patent system. As Boldrin and Levine contend, “the ‘optimal’ patent system that a benevolent dictator would design and implement is not of this world and it is pointless to advocate it as, by doing so, one only offers an intellectual fig-leaf to the patent system we actually have, which is horribly broken. It is fine to recommend reform but, if politics make it impossible to accomplish that reform, if they make it inevitable that if we have a patent system it will fail, then abolition is the proper solution and proposals of reform are doomed to fail.” (Boldrin & Levine, 10) The problem is that any amount of patent protection, no matter how carefully crafted, risks evolving over time along a negative trend line. “Once some kind of even marginal IP protection is introduced, extending it will yield substantially higher per-capita rents to the few holders of the right than reducing it would for the much larger number of non holders.” (Boldrin & Levine, 11) The empirical and theoretical data bear out the trend: once some patent exists, it will trend toward an over-broad and stifling character.

This stems from the fact that consumers are simply not a primary part of the patent system. The actors negotiating the scope of protection are largely comprised of individual inventors, corporate interests and patent trolls; these actors interface with the patent office, patent lawyers and the courts. “Since patenting is a technical subject about which few voters know anything with clarity […] the interests of voters are not well represented at all, but rather the competing interests of the other players.” (Boldrin & Levine, 12) These actors form the engine

driving the trend toward increasing scope of patent protection, and while they may have differing specific interests, they all share one core interest: getting more patents issued. “Hence the patent office is constantly under pressure from its clients to be more generous in issuing patents – that is, adopt lower standards of obviousness and steeper standards for what is considered prior art” (Boldrin & Levine, 13) Even more problematic is the fact that these actors can change roles in the system to play parts that represent clear conflicts of interest.

“In 1982 – lobbied by patent lawyers – Congress passed the Federal Courts Improvement Act. This moved patent appeals from the regular court system to a special court system for dealing with patents. Naturally many of the judges for this new court were chosen from the ranks of patent attorneys. For example, in the 1994 Tektronix decision expanding the scope of patents to software, of the six judges who voted in favor (Rich, Newman, Lourie, Michel, Plager, Rader) half had previously been patent attorneys, while of the two that voted against (Archer, Nies) neither had been.” (Boldrin & Levine, 14) The arbitrator is now inherently biased toward a given outcome.

Yet perhaps this is not an inevitable feature of a patent system, but rather is more indicative of a broader political economy and engagement issue. Perhaps it is possible to inject consumer groups more directly into the negotiation process surrounding patent policy and law so that they could act as a counterbalance and preserve more reasonable scope of patent protection. However the feasibility of this seems dubious. The financial and technical strength of the aforementioned power players seems set to always give them the upper hand. A systematic modification to the quality of education that consumers are given on patent law, combined with the rise and fostering of strong consumer groups could make it a more level fight, but ultimately consumers will always be at a disadvantage in understanding the landscape. Corporations and

lawyers live and breathe patent policy and law intricacies and have more capital on hand than consumers. The political economy of consumers coming together to ensure patent law does not overreach is no match for that of huge industrial players who are already entrenched in the landscape.

If we cannot fix over-broad patent protection, can we at least reform the patent system to prevent the fractured rights and the "tragedy of the anticommons?" Heller contends, "The gridlock problem is distinct from the routine underuse inherent in any well-functioning patent system. By conferring a temporary monopoly on an invention, any single patent necessarily increases prices and restricts use. We willingly pay this cost to motivate invention and disclosure." (Heller, "You Can't Hear Me Now") Heller's conception of gridlock is that it is something that is slightly unnatural, a tipping of the balance away from the operational equilibrium. Gridlock seems more a political problem than a raw problem of patent architecture. Thus solutions to gridlock should be possible. As Heller describes, government can step in and force the creation of patent pools to rebundle fragmented rights. We saw this concept successfully deployed in airplane patents in 1917. It seems logical to suggest that the PTO formalize such an endeavor, create a "gridlock busting" office that allows individuals in gridlock-plagued industries to submit complaints to the PTO requesting mediation assistance. The PTO's gridlock office could then step in and force collective bargaining among the rights holders. It could threaten to decrease terms on patents, or outright revoke them if the parties do not reach an agreement to pool with amenable terms by some arbitrary date. The government could create a bundling arm of the PTO, or could otherwise hold a prize for a private firm to become such an entity. After all, as Heller contends, "assembling fragmented property is one of

the great entrepreneurial and political opportunities of our era." (Heller) There ought to be a solution to the gridlock problem.

However I disagree that a meaningful solution is achievable. Gridlock is another tragic trend line that expresses itself in patent protection systems. After a while, patents build up faster than they are cleared, and innovation slows down as a result. I contend that patent gridlock will always risk being inherently pervasive because of the very nature of technology.

Patent is Incompatible with the Modular Nature of Technology

Technology can be thought of as a modular and fluid possibility space made from past innovation recombined in new forms. "Novel technologies are created out of building blocks that are themselves technologies, and become potential building blocks for the construction of further new technologies." (Arthur) This modular recombination, as Brian Arthur describes in "The Nature of Technology" is at the root of technological innovation. It drives the evolution of technology. Both life and technology evolve, although not quite in the same manner since technology can evolve at an exponential rate of growth.

"Technology builds out not just from combination of what exists already but from the constant capturing and harnessing of natural phenomena." (Arthur) Technology is modular in a more philosophical sense than mere components; it is comprised of myriad approaches, techniques and the ambient phenomena available to us as residents of the Universe we inhabit. "Technology creates itself out of itself. In this way the collection of mechanical arts that are available to a culture bootstraps itself upward from few building-block elements to many, and from simple elements to more complicated ones." (Arthur) Yet in a world of patent, this upward building on the past is stymied by rights-holders. Even with limited terms, patent serves to create an artificial scarcity around the ideas required to progress technology forward. Arthur discusses

technology from a complexity science and philosophical lens, and as such tends to ignore the messy details of the halo of patent that surrounds the modules of technology's edifice. Heller states Arthur's modularity differently, reflecting the core yet adding the patent. "Today, the leading edge of wealth creation requires assembly. From drugs to telecom, software to semiconductors, anything high tech demands the assembly of innumerable patents." (Heller) As we have seen in software and 3-D printing modern technology is created from vast webs of interconnected technologies and concepts.

"This is a general rule: what starts as a series of parts loosely strung together, if used heavily enough, congeals into a self-contained unit. The modules of technology over time become standardized units." (Arthur) Yet patents do not. While technology is becoming more modular and recombinant, patent protection is not. We are entering into a time when even the most trivial digital devices are comprised of a myriad of modules, each potentially with a different process or product patent. "In the real world, technologies are highly reconfigurable; they are fluid things, never static, never finished, never perfect." (Arthur) Patent simply does not accept this deeper philosophical truth. Each patent creates a rigid border around what is actually the very amorphous concept of intellectual property. "With a plot of land or a string of pearls, it's easy to tell where one person's property ends and another's begins. With something as abstract as an invention, however, those lines are fuzzy and likely to shift over time." (Heller, 50)

In the modern day, patent barriers surround many of the modular components that new innovators could incorporate to create new technologies. "In an information economy, any piece of intangible property, such as a patent, is also a monopoly." (Heller) If the innovators fail to do their homework, their new recombinant invention could infringe on some previous modular invention. If they do their homework and find all potential prior art but choose to innovate

around the patent gaps, they are ultimately left with a considerably smaller possibility space of modules to innovate with. Either way patent has stymied the innovative potential of technology. "The basic problem with the patent system – the downstream-blocking effect of existing monopoly grants on future innovation – is greatly increased because modern products are made up of so many different components." (Boldrin & Levine) Patents artificially limit what could be a rich landscape of modules to recombine into new innovative forms. This is creating an inhospitable landscape for future generations of innovators, particularly in the Maker movement.

Wither the Makers

Chris Anderson presents an account of a modern Open Source movement in hardware manufacturer, called the Maker movement. "Just as online communities of programmers created everything from the Linux operating system that runs most of today's websites to the Firefox Web browser, new communities of Makers are doing the same with electronics, scientific instrumentation, architecture, and even agricultural tools. There are now scores of multimillion-dollar open-hardware companies." (Anderson) These individuals tinker and design out of a desire to innovate, not a desire to patent. In the same spirit that first breathed life into the digital computing revolution, the Makers are experimenting with the tools and approaches of tomorrow. "This nascent movement is less than seven years old, but it's already accelerating as fast as the early days of the PC, where the garage tinkerers who were part of the Homebrew Computer Club in 1975 created the Apple II, the first consumer desktop computer, which led to desktop computing and the explosion of a new industry." (Anderson) While Anderson is perhaps being hyperbolic, it is not unrealistic to draw similar parallels; who knew that hackers playing with electronics would change the nature of global economy and society so profoundly? The Maker

movement seems a modern vanguard for innovation, yet patents risk stifling the Makers' ambitions.

Indeed Anderson contends that the "Maker" movement that he participates in and writes about is staring down looming patent threats. He states plainly that the Maker movement is essentially waiting for the lawsuits to mount, but sees that inevitability as part of the organic disruption that the Internet brings. "'This is what the web does,' Anderson said: 'You're incentivized to try things out, to iterate, to throw it out there and see what happens.' And that kind of freewheeling invention is bound to butt heads with a system that stridently emphasizes the 'property' aspect of 'intellectual property.' (Garber) This represents an entirely different story from the traditional rationale for patents: far from incentivizing innovation, patent claims risk sinking an entire emerging mode of production. Anderson is contending that it is the free-flowing nature of the web that incentivizes the Makers' creativity, not the patent system. "The existence of a large number of monopolies due to past patent grants reduces the incentives for innovation as current innovators are subject to constant legal action and licensing demands from earlier patent holders." (Boldrin & Levine) Makers are the people the patent system is supposed to incentivize; instead it risks crushing their efforts.

We Don't Need Patent Anyway

There are real world examples of production without exclusive property in the form of the Open Source software and Maker movements. These networks of individuals contribute to projects in a collaborative mode of production, and most often for free. As Stephen Weber describes in The Success of Open Source, "property in Open Source is configured fundamentally around the right to distribute, not the right to exclude." (Weber, Kindle Loc. 237)

The legal innovation that empowered the Open Source production modality to thrive arose from Richard Stallman's clever assertion of his copyright to create a license chain, called the GNU Public License or GPL, where each person who modified his software had to release his or her version to the world under the same license. Stallman "released pieces of his code under a license that allowed anyone to copy, distribute, and modify the software in whatever way they pleased. He required only that, if the person who modified the software then distributed it to others, he or she do so under the exact same conditions that he had distributed his software." (Benkler, 65) If someone did not distribute their modified version of the software to others they would then be in violation of Stallman's copyright. "This legal artifice allowed anyone to contribute to the GNU project without worrying that one day they would wake up and find that someone had locked them out of the system they had helped to build." (Benkler, 65) This approach largely solves gridlock

"We award patents because monopoly profits create incentives to invent and because patents give inventors incentives to disclose their discoveries (without patents people might prefer to invent things they could keep secret)." (Heller, 45) Yet this is not what we see. The actual individuals innovating in the open landscape are not doing it for the incentive of patent; they are doing it to make better inventions. Of course large corporations are not so altruistic, they are often inventing for profit first and joy second, they often look to patents to secure their rights. But are we trying to protect the rights of large companies or "to promote the progress of science and useful arts?"

The Open Source software movement and the Maker movement have shown that immense innovation can arise through collaborative production focused on access rather than exclusion. Ideas are non-rivalrous, and the Open Source accepts this heartily, applying an

innovative licensing scheme that guarantees access rather than facilitating exclusion. Rather than returning the wine to the bottle, Open Source lets it flow while sharing the winemaking process so that everyone collaborates in the effort.

As a solution to gridlock, Open Source is brilliant. “On the intellectual property side, we’ve seen the “Open Source” movement and Creative Commons help people voluntarily assemble computer software and related intellectual property. These regimes are not anarchic. They are complex legal and institutional forms with a simple goal: to help dispersed individuals overcome gridlock without government coercion.” (Heller) Open source licensing is a core way to ensure that no one actor can stop the show. By forcing downstream licensees to redistribute their modifications, the incentive for innovation is large and the environment of possible new modules to recombine is delightfully open.

Anderson contends that modern innovators prefer working in the light under Open Source licenses than trying to carve out individual rights on contributions to the technological landscape. “Today, inventors increasingly share their innovations publicly without any patent protection at all. That is what Open Source, Creative Commons, and all the other alternatives to traditional intellectual property protection do.” (Anderson) By innovating in public, ideas become refined much more quickly and contributions to the effort happen naturally since the most gifted individuals can see and contribute to any open project.

“Rather than top-down innovation by some of the biggest companies in the world, we’re seeing bottom-up innovation by countless individuals, including amateurs, entrepreneurs, and professionals.” (Anderson) Yet the large companies have the patents and the ability to block newcomers. “In most industries the first mover advantage and the competitive rents it induces are substantial without patents.” (Boldrin & Levine) Particularly as products function more as

platforms, they benefit from network effects that grant first movers big advantages in functional monopoly. Users of the iOS or Google Android platforms are not there because of patents, they are there because of network effects–a situation where the value of a resource for each of its users increases with each additional user–and lock-in techniques designed to keep the growth going one direction. "The rationale for patent systems is weak." (Boldrin & Levine) When downsides are weighed and the actual incentives to innovation are teased out, the patent system appears a blunt object in a nimble world.

So what protection is left? Enter Trademark

What becomes more important is Trademark. Increasingly brands and brand loyalty are serving to function as normative and legal protection for innovators working out in the open. "Many open-hardware projects share the design files of their products, but reserve their names and logos as proprietary trademarks." (Anderson) This allows access to the Open Source community while still allowing for the sale of the innovation. Anderson contends that the work of Open Source Maker companies is copied frequently, but does not view it as a destabilizing issue.

"How will people know the difference between our products and clones allowed by our open-source license? Because the clones can't use the same name. The only intellectual property that we protect is our trademarks, so if people want to make the same boards, they'll have to call them something else. This is the same model used by the Arduino project. You can make a copycat board, but you can't call it "Arduino" (although you can call it "Arduino compatible"). This goes all the way to removing the logo, name, and artwork from the PCB design files that are publicly distributed. It's a great way to maintain some commercial control while still being committed to the core principles of Open Source." (Anderson) The consumer benefits from more

choice and has strong brands to guide them. Innovators benefit from designing in a landscape where access and sharing are prioritized over property.

Winding Down the Patent Wars

If innovation ever needed patents, it no longer does. Where once inventors needed to get patents and turn over their designs to large firms, now they can click "make" and have a model printed at any number of generalizable factories running the same standardized code across the world. Now innovation only needs ideas and ambition. There are a slew of services and technologies that have opened up manufacturing innovation to everyone, just as the PC did for software design. "What all these services offer, from the machine shops of MFG.com, the low-cost factories of Alibaba, or the one-off digital fabrication of Ponoko and Shapeways, is the ability to make things from your desktop without your having any tools of your own or stepping into a factory. In a sense, global manufacturing has become scale-agnostic." (Anderson) Just as the web allowed anyone to reach the world, trends in manufacturing technology and digital design are enabling anyone to scale from Maker to entrepreneur in an elegant and powerful way. The innovators of tomorrow are emerging from the bottom up, not the top down. The future of innovation is emerging from the billions of empowered individuals strewn across the globe with access to powerful new technologies and services that let them turn their ideas into reality. Patent is incompatible with these individuals, it is serving to stifle their potential.

It has come time to abolish patent. This can be done gradually over time, as when trade restrictions were abolished. As a first step the scope of patentable things must be capped. Boldrin & Levine propose concepts to roll back the tide of patents. The most notable involve "tailoring patent's length and breadth to different sectorial needs," along with "Reversing the burden of proof: patents should be allowed only when monopoly power is justified by evidence about fixed

costs and actual lack of appropriability. The operational model should be that of 'regulated utilities': patents to be awarded only when strictly needed on economic grounds." (Boldrin & Levine) "The aim of policy, in general, should be that of slowly but surely decreasing the strength of intellectual property interventions but the final goal cannot be anything short of abolition." (Baldrin & Levine) We must accept that patent systems trend toward over-protection for substandard conceptions, and are intrinsically susceptible to creating gridlock scenarios. Patent is not incentivizing innovation it is stifling it. The fact that terms like "mutually assured destruction" are applied to patent action shows us things have gone too far. Patent has become a weapon more than anything else. The time has come to disarm that weapon.

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