

Ideas are not like other assets

Intellectual Property Rights (IPRs) are supposed to be a system to reward creative thinkers. But Danny Quah finds that all too often they fail both in theory and in practice. Here he explores other possibilities, particularly in relation to computers and software.

Creative people produce ideas. Let us call them *intellectual assets*. New knowledge, building layer upon layer on itself, has been the basis of the phenomenal change for the better in the human condition in the last 200 years, transforming the economically dismal world of the previous 12,000 years.

Kenneth Arrow, the Stanford University economist and 1972 economics Nobel laureate, liked to use the conundrum that hypothetical financial supporters of 17th-century scientific research might have confronted if faced by two grant applications: the first, proposing to study the properties of different woods and metals in constructing the hulls of ocean-going ships; the second, proposing to analyse the properties of the square root of -1. The first offered immediate benefits to society. But the second?

How could anyone have foreseen that the square root of -1 (which Descartes

referred to in a derogatory way as an imaginary number) would make intuitive the formulas in Einstein's theories of special and general relativity; would become an integral part of quantum mechanics; would enter Maxwell's theory of electromagnetism and thus be used by every electrical engineer, radar operator, signals analyst and telecommunications specialist in the coming four hundred years; and would be embedded in every electrical gadget, personal computer, Internet device, or mobile telephone that we use today?

Two features are central to this story. The first is the way in which economic growth draws at its most fundamental level from interaction with knowledge and ideas. The second, (described by Douglass North, the economic historian and 1993 Nobel laureate) is the intermediating system by which societies have figured out ways to reward innovators and agents of creativity by giving them property rights in ideas.

The story goes like this. Strong property rights legally identify an owner, including the owners of ideas. They transform mere assets into property specific to particular individuals. In doing this, those property rights sharpen the incentive to develop and put to productive use the resources owned. Society gains as well through the provision of worthwhile goods and services.

This is an extremely orthodox, neoclassical economic story of the kind that we teach to students in universities worldwide. Strong property rights and voluntary exchange, through markets or otherwise, lead to socially optimal outcomes. Such arrangements, almost magically, align the self-serving behaviour of individual property owners with the good of society at large. This proposition is not just a creed of conservative apologists for the capitalist system. It is an insight that serves well for a simple reason: it works.

Since economically worthwhile ideas

Ideas are nonrival and infinitely expandible



are productive assets, the seductive and easy parallel conclusion is that intellectual property rights (IPRs) should lead similarly to good social outcomes. Michael Eisner of Disney Corporation and Jack Valenti of the Motion Picture Association of America have indeed argued that strong intellectual property rights are absolutely fundamental to the efficient workings of economies.

This conclusion, unfortunately, is wrong.

To understand why, we need to dig a little bit into the nature of ideas and knowledge. Ideas are nonrival and infinitely expandible. Their use by someone does not detract from the usefulness in their nature to yet others. Trading ideas is not an exchange where ideas are handed over for something else; instead, trading ideas simply creates copies of the idea, each exact copy of the idea as much of an original as the original idea itself. In these characteristics, ideas have an intrinsic nature to them that distinguishes them from all other ordinary economic commodities.

Ordinary commodities *are* rival. Once someone has eaten an apple, that apple not only cannot satisfy anyone else's hunger; the apple is physically no more. Ordinary commodities do *not* carry infinite expandibility. Apples exchange for, say, oranges by being physically handed over. One party to the trade goes home bereft of apples but with pockets full of oranges. Apples do not reproduce freely and instantaneously on demand.

The upshot is that trade in ideas differs from trade in most other things economically valuable. The neoclassical reasoning on why voluntary exchange succeeds in delivering so much good to so many breaks down for ideas. When an idea-owner sells the good, he continues to have it. Both buyer and seller and all others in similar situations will see incentive to keep selling (and in the process making) copies of the idea as long as that idea's market price

remains positive, given that the opportunity cost to them of providing further copies of the idea is zero, for they continue to retain the idea to use or consume however they wish. The process ends only when the market is completely saturated. But a forward-looking, purposeful idea-maker – the creative knowledge-worker, the putative newly entitled intellectual asset owner – will realise this dynamic is in place long before the total saturation point is reached. He will move on to do something more financially rewarding (perhaps becoming a plumber in north London).

Societies can put in place some friction to that free competitive exchange and dissemination of ideas. Useful ideas could be kept as trade secrets, divulged only to specific individuals or to particular industry groups, forming trusted coalitions. Ideas could be handed over only with tight restrictions on what can be done with them. Laws could be set up that do no more than disallow competition between alternative idea-producers. Technologies might be built that slow down the transmission of ideas. Whatever it turns out to be, these arrangements work by disrupting markets. Through curtailing the distribution and dissemination of ideas, such arrangements raise the exchange price of ideas and thus incentivise creativity.

Intellectual property rights are one such disruption in markets. They are not ordinary property rights but they prevent perfectly competitive dissemination of ideas, so that ideas end up under-used in the world. Intellectual property rights restrict how ideas can be built on, sequentially refined and iteratively improved. They prevent development of socially desirable, closely competing ideas. They encourage applying creativity and ingenuity to circumvent their strictures through finding legal loopholes, but without improving the lot of humanity by pushing outwards the frontier of technology. They create monopolies in the market for ideas. But IPRs are also, if not a strictly

necessary evil, for now at least an evil that gets the job done of incentivising knowledge-creation.

The world would be a dire place were no new ideas being constantly created. But at the same time having so much of the creative output of humanity cordoned off cannot be a good thing either. Let us call this the essential, inherent tension in intellectual assets and let us reserve the term "intellectual property" for when the artificial construct of property rights are asserted over such assets.

This inherent tension, in one form or another, has been long recognised, even if not always openly acknowledged in contemporary policy debate. William Nordhaus analysed it in his economics PhD dissertation at Yale in the late 1960s. Two centuries before that, Thomas Jefferson, one of the drafters of the US Constitution, wrote powerfully on the nature of ideas, articulating the concepts of nonrivalry and infinite expandibility. While he founded the US Patent Office and provided in the US Constitution a clause that protects intellectual property, he considered the monopolies thus created a national embarrassment. (This particular founding father of the United States of America never thought it unAmerican to dispute the status of intellectual property.)

Remember this delicate trade-off: society-wide curtailment and underemployment of ideas (Jefferson's national embarrassment) set against the potential good that incentivising creativity ought to deliver. But is this trade-off for real? Does current IPR practice succeed at the second task of incentivising and rewarding? Some propositions in economic theory fail to hold in reality. Some empirical regularities from the real world pose puzzles for economic theory. But the current formal systems of intellectual property might have the singular distinction of failing not just in theory but in practice as well.



Patent infringement is a civil not a criminal offence

There is this powerful conceit of the lone inventor, puttering about in the garage or in the woodshed at the bottom of the garden, coming up with world-beating inventions at the weekend, but ending up with no financial gain. Without a social infrastructure of protection, these amateurs without business savvy are ripped off by some ruthless multinational corporation. (Even with IPR slapped around an idea, because patent infringement is a civil not a criminal offence, a patent-holder still has to take an offender to court, involving costly litigation way beyond the means of most people.)

Even when they work properly in theory, intellectual property rights confound the workings of markets and thus potentially inflict social damage. In practice, they sometimes do not even achieve their supposed good of rewarding the deserving and thus incentivising the creative originators of ideas. Indeed sometimes they perversely reward the undeserving.

At the turn of the 20th century, Thomas Edison built an empire around his creative output of inventions – the light bulb, electricity provision by networks, the phonograph, the modern dynamo and hundreds of others. Edison founded a company that went on to become the world's largest and most successful corporation. He accumulated personal wealth that placed him within the top 400 of the US's richest individuals.

By contrast, Nicholas Tesla, Edison's contemporary and great rival who held over 700 patents on radio, fluorescent

light, the alternating current motor, wireless communication and much else, died miserably poor, spending his last years feeding pigeons outside New York's Public Library. Yet it was Tesla's AC motor that allowed viable electricity transmission over Edison's networks, when Edison wrongly persisted in wishing to retain DC technology. In the event, Tesla's critical idea prevailed but went unrewarded, while Edison's wrong-headed one garnered the financial rewards. Public relations and entrepreneurial savvy trumped the raw intellectual idea.

This negative message echoes in example after example: Gary Kildall's operating system for personal computers, CP/M, developed a decade before Bill Gates's deal with IBM, did not give Kildall even a tiny fraction of Gates's hundred billion dollar wealth or save him from death in a barroom brawl with some bikers (as one colourful legend has it). Eli Whitney's 1792 patent on the cotton gin won him no part of the US's 900-fold increase in cotton exports over the ensuing 70 years (by which time cotton accounted for half the value of total US exports to the rest of the world). Xerox Corporation held patents on the laser printer, Ethernet, graphical-interface computer operating systems using multiple windows, mouse and keyboard, and WYSIWYG word processing. These concepts were successfully exploited by everyone else, but not by Xerox Corporation itself.

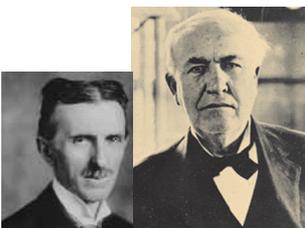
Just as intellectual property rights have not always protected an innovator, nor

does their strengthening necessarily generate greater innovation. The dramatic increase in strong intellectual property rights awarded in the US since 1975 reflects, in part, court decisions extending patent protection for software. However, this strengthening and extension of IP coverage did not obviously elicit greater innovation effort in the industry. Between 1987 and 1994 real R&D spending in the computer and software industry fell 20%, while the number of patents awarded increased 200% and real R&D spending in corporate America overall rose 25%.

What have we learnt from this experience? In theory, property rights on ideas inflict losses in social efficiency; humanity ends up under using ideas. Again, in theory, societies tolerate this because those property rights are needed to reward and incentivise the creators of ideas. In practice, however, we have just seen many cases where intellectual property rights don't do this last bit well at all, either through not providing enough reward to the right people or through providing too much to the wrong ones. In all those situations and many others like them, society has simply sacrificed economic value to no good purpose whatsoever. Our loss from current arrangements for managing intellectual assets is double.

But societies and economies are surprisingly adaptive organisms. When an itch manifests itself, a mechanism for scratching that itch eventually appears as well, without necessarily anyone consciously designing that scratcher. The process, however, can

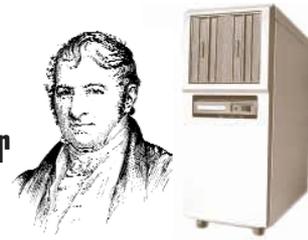
IPRs prevent the competitive dissemination of ideas



IPRs do not necessarily generate greater innovation



Our loss from current arrangements for managing intellectual assets is double



be slow and there is nothing to stop us trying to speed things up.

Mechanisms that can circumvent the economic difficulties that ideas, creativity and knowledge introduce can be divided into two kinds: conscious intervention and hands-off (spontaneously emergent) social behavior.

The economic historian Paul David has noted how institutions such as patronage and procurement can provide substitute incentive mechanisms in place of intellectual property rights. Both of these are found in the real world – Research Council support for academic research, military or space exploration contracts and wealthy patron support for the arts are some prominent examples. These distance the incentive for creating an idea from the individual rewards arising in its dissemination.

Yet other suggested schemes work similarly, by separating dissemination reward from initiation incentive. Jenny Lanjouw, a former PhD student at the LSE, has proposed global market segmentation in intellectual property rights for pharmaceuticals that could potentially benefit the poor and disease-afflicted in the Third World, without disincentivising pharmaceutical innovation in the West. Michael Kremer at Harvard has suggested that patents be auctioned off generally, but with governments randomly buying some of the intellectual assets for release into the public domain, thereby freeing those intellectual assets into socially efficient usage.

Finally, perhaps an even crazier suggestion: divert what government and legal resources societies currently expend on determining and protecting intellectual property rights – patents, copyright, trademarks – into building instead mechanisms for providing an appropriate and reliable flow of intellectual services derived from the underlying intellectual assets. Unlike the intellectual assets

themselves, such services would be rival and finite and would show none of the market failures described above. Since we already have a Financial Services Authority, we might also have a parallel Intellectual Services Authority!

Interestingly, the computer software industry, so active in the intellectual land grab, is also the one that has seen greatest innovation in institutional mechanisms. Open Source Software is the most notable such example. The term describes software that is provided with the underlying code available for others to refine, develop and learn from.

SourceForge.net, the largest repository of Open Source code and applications, hosts over 71,000 software projects, all freely available for downloading over the Internet. Some of these are, admittedly, of interest primarily to the technical community, but significantly many others are of general consumer and end-user interest: office productivity, information management and database suites that rival those from commercial market leaders; messaging client systems that outgun any commercially sold; video and music applications providing functionality beyond any commercial software; and some truly remarkable computer games.

These ideas are given away, not sold. Worldwide communities of capable software engineers and hobbyists – better than money can buy – converge, metaphorically at least, on the Internet, to code and debug useful software, which is then released for the world to use and improve. Corporate backing from companies such as IBM, Intel, Nokia and Sun Microsystems and support services from companies like Red Hat have provided credibility and legitimacy to the Open Source movement.

As with markets, these developments show emergent behavior, with no strong, single central command, but

with global efficient out-comes spontaneously arising from uncoordinated individual actions and economists have begun to study the workings of this Open Source mechanism.

We might at this stage understand how, say, individual Open Source programmers could be doing this work only for its high profile apprenticeship signalling function; they are building reputations and lying in wait for transition to high-paying, IP-protected jobs. But we do not really understand why such spontaneous, emergent behaviour achieves the successes and social optimally outcomes that it has. Why are the resulting products so often better and more innovative than their commercial, IP-protected counterparts? We can only conjecture that, somehow, in separating the dissemination rewards from those accruing to innovation, the Open Source mechanism attempts, with no explicit guidance, to reinstate endogenously one socially efficient outcome.

Perhaps it is a model that we can use for other ideas than software. Ian Ayres and Barry Nalebuff at Yale University have attempted to initiate such a model in their recent book, "Why not? Using Everyday Ingenuity to Solve Problems Big and Small" and on its associated whynot.net website. It may all seem a bit crazy, but not obviously more so than the current system we have for managing intellectual property.

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This article is an edited version of his Clifford Barclay Memorial Lecture delivered at the LSE in November 2003.