

In many countries, control over information has become a big issue. An underlying aspect of this control has been the use – or threat of use – of force to establish control. The aim is often to prevent information from being freely exchanged, creating an artificial scarcity that keeps information prices high. The fight to protect such freedoms is being fought out in many different arenas. *Roberto Verzola* explores the synergies, similarities and differences between those trying to protect the freedom of innovators in the worlds of software and seeds.



Software and seeds

Lessons in community sharing

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Among our most fundamental freedoms is the freedom from violence – or threat of violence – when we decide to withhold information. It is a human right that lies in the same category as freedom of thought. In commerce, this freedom takes the form of trade secrets. When someone attains a competitive advantage in commerce through a unique insight, idea or knowledge, nobody else should be allowed to use force to extract their secrets. Patents were initially conceived to coax trade secrets out of the people who would otherwise have taken these secrets to their graves. If society deemed the secrets important enough, it was willing to extend a special monopoly privilege, called a patent, in exchange for the disclosure of these secrets. The patent gave inventors an exclusive right to commercially exploit their inventions for a number of years, after which the invention then passed on to the public domain.

Today, patents have gone way beyond their original purpose. Even genetic sequences and algorithms are being patented, even if they are in no danger of being lost to society should their discoverers pass away tomorrow. Patents have instead become monopolistic instruments for keeping out competition and extracting the highest profit margins from the public – ironically using public institutions to do so. This teaches us a lesson we must learn by heart: relying on statutory monopolies to encourage intellectual activity is a pact with the devil.

In a free society, keeping secrets (i.e. information) is an act of freedom, and sharing it with others is another act of freedom – as long as neither is done under compulsion. While a piece of information stays in somebody's mind (or private notes), their freedom to keep it secret should be respected. But once that person releases the information – by





distributing a printed version or posting it on the Internet – they surrender that freedom, and the freedom of others to share the information should be respected. The use of copyrights, patents and other statutory means of restricting the use or exchange of information is a restriction of such freedom, because enforcing copyrights and patents requires the use, or threat of use, of force.

Another option exists for those who want to keep secrets: technology. These days there are many examples of people taking this approach: we see it in copy-protection schemes, withholding software source code, hybrid seed varieties, and so on. People who use technology to guard their secrets should not be forced to abandon such measures. But by the same token, force should not be used against those who use similar technological means to pry secrets open. This is often the engine that drives technological progress forward, as methods for locking information or opening it up battle it out in a technological contest. Prohibiting technologies that pry out information locked up by technological means is as much a restriction of people's freedom to pursue knowledge and invention as prohibiting technologies that lock up information.

Seed and software freedoms and privations

In the world of free and open software, different levels of technological 'freedom' can be identified. The software that uses the least force to compel behaviour is the 'freer' software. From this perspective, "freeware" (software released to the public domain with no conditions and therefore no need to enforce any license at all) is the freest software of all. This is followed by free software variants that impose fewer conditions (such as the BSD License condition for attribution). GPL and similar licenses come next, and then variations of the "shareware" concept. Least free are the commercial programs whose executables can neither be copied nor modified without risking legal action and whose sources are carefully kept under lock and key.

Can these concepts of information freedoms be applied to other knowledge systems? Many ancient tribes have developed their indigenous systems of knowledge (a form of "software") which are often the basis for their cropping systems, healing arts, rites of passage, seasonal celebrations, religious practices, artefacts of cultural identity, and other aspects of culture. Their seeds, herbs, weapons, dances, music, chants, epics, weaving styles, costumes and religious icons are all parts of this indigenous knowledge system. Increasingly, in a shrinking networked world where information can

circulate globally within seconds, such knowledge systems find themselves being drawn into various forms of interaction with the rest of the world, and similar issues of use and access, of inclusion and exclusion, likewise emerge.

Seeds, medicinal herbs and other genetic resources, for instance, have variously been considered "a common heritage of humankind", "national patrimony", and "community resource". In the hands of corporations, they have also been exploited, commercialised, appropriated as private property, and eventually monopolised under intellectual property regimes such as patent systems.

Seeds, in particular, appear to be subject to the same considerations as free software. Farmers share them freely; improved varieties are developed by farmers through selection and breeding, and then returned to the common pool of seeds. Some seed developers try to retain control over the seeds by releasing only first generation or F1 hybrid seeds, which are in effect "copy-protected" because they do not breed true. The language is even similar: Varieties that breed true, whose desirable characteristics reappear from generation to generation and are therefore not copy-protected, are called *open* pollinated varieties, just as software that can be freely shared and easily modified are called *open* source software. It even seems entirely appropriate to refer simply to free seeds or to open seeds.

The most controversial issue with seeds today are issues of privatisation and monopoly, as the whole system of free and open sharing of seeds within the community is continually being undermined and threatened through corporate efforts.

The farmers' age-old system of seed exchange is being undermined by hybrid varieties, which are useless for exchange because they do not breed true. Prevented from maintaining their own seeds from generation to generation, farmers will be forced to rely on corporate suppliers for seeds, losing their control over this essential element of food production, cropping systems and agriculture. If it were a simple matter of choice, farmers could just stick with their traditional varieties and breeding methods, and simply refuse to use hybrids at all. This is how copy-protected software was rejected by users: they simply did not buy it. But governments often collude with corporations to wrench control over seeds away from the hands of farmers by making traditional varieties and open seed exchange illegal, and by using public funds mainly or even exclusively for hybrid seed development and hybrid seed subsidies. The

future of seed “copy-protection” systems includes “terminator” technologies and their variants, which simply terminate the biological cycle of seeds sprouting into seedlings that mature into plants which bear new seeds that will continue the same cycle, generation after generation (see box).

Going beyond technological copy-protection, corporations are staking private ownership claims over modified seeds, which enable them to call on state enforcement mechanisms to stop others from sharing or exchanging seeds. Just as software developers use copyright, seed companies use plant breeders’ rights and, increasingly, patents. The result is the growth of private seed monopolies.

Private monopolies and technological copy-protection cannot succeed without backing from the enforcement arms of the government. It is only through force, or the threat to employ force, that can keep farmers from freely engaging in their age-old practice of seed sharing and seed exchange. Even then, many farmers will surely defy the authorities and put their lives on the line, rather than surrender this age-old practice.

Selling and sharing: can they coexist?

Similar debates simmer amongst farmers and software developers over how ‘free’ their products should be. Some farmers’ groups oppose any selling of seed, taking the position that seeds should only be shared. They fear that once the practice of selling and buying seeds is established, seeds will become targets of privatisation and monopoly. Other groups believe that the decision to share or to sell seeds, or even to do both on a case-to-case basis, should be left to each farmer. Farmers have often found the need to buy seed, or to sell it, but as long as every farmers’ freedom to save and share seeds freely is respected, and seed saving and sharing can go on side by side with seed selling, seed monopolies cannot take over.

Among many tribes today, the commercial sale of cultural artefacts is also a matter of intense debate. Indigenous advocates have often pointed out that such artefacts – carvings and sculptures, religious icons, costumes, music, etc. – represent the very essence of the tribe. To allow crass commercialism to dictate their production and practice can only do deep damage to the tribe’s culture and soul. Others have pointed out that as tribe members come into contact with modern society, they inevitably acquire a taste, if not need, for some modern artefacts themselves, just as modern society takes interest in their traditional artefacts. A market therefore invariably grows out of this exchange.

Without this exchange, the tribe’s younger members, influenced by modern society’s intrusive media, might abandon tribal life altogether. When the young stop reproducing the culture of their tribe, the tribe may disappear within a generation. By undertaking commercial production of their cultural artefacts, as long as a certain separation can be managed between the commercial and the cultural aspects, a tribe might manage to retain its culture and identity within modern society. What is “best practice” in this case is probably still a matter of debate among and within the tribes themselves.

Two of a kind: GURTs and DRM

Genetic Use Restriction Technologies (GURTs), better known as Terminator technology, are a group of technologies that provide a mechanism to switch previously introduced genes on or off, using external inducers like chemicals or physical stimuli (e.g. heat shock). This mechanism allows for restricted use or performance of transgenes. There are two main categories of GURTs, namely trait-related or T-GURTs and variety-related or V-GURTs. While T-GURTs aims to control the use of traits such as insect resistance, stress tolerance or production of nutrients, V-GURTs aims to control reproductive processes that will result in seed sterility, thus affecting the viability of the whole variety. The ability to switch the GURTs mechanism on or off externally enables the producer to exercise control over traits and/or the viability of seeds.

In the digital world the GURTs parallel is the DRM (Digital Rights Management). DRM is an umbrella term referring to any of several technical methods used to control or restrict the use of digital media content on electronic devices with such technologies installed. The media most often restricted by DRM techniques include music, visual artwork, computer and video games, and movies. The parallels with GURTs is not lost on those working on DRM. “The funny thing is that we were thinking of using the term DURTs (Digital Use Restriction Technologies) before we knew what was going on in the biotechnology arena” says British hacker and free software developer MJ Ray. DURT is technically a more accurate term, because the “rights” that a content owner grants are actually technical capabilities, and are different from the legal rights of a content consumer.

Some digital media content publishers claim DRM technologies are necessary to prevent revenue loss due to illegal duplication of their copyrighted works. But many others argue that transferring control of the use of media from consumers to a consolidated media industry will lead to loss of existing user rights and stifle innovation in software and cultural productions. No current DRM technology includes a mechanism to enable ‘fair use’ rights *per se*; the content publisher may choose to allow some acts of copying, which may (or may not) align with legal use rights.

Although technical control measures on the reproduction and use of application software have been common since the 1980s, the term DRM usually refers to the increasing use of similar measures for artistic works/content. Beyond the existing legal restrictions which copyright law imposes on the owner of the physical copy of a work, most DRM schemes can and do enforce additional restrictions at the sole discretion of the media distributor (which may or may not be the same entity as the copyright holder).



In the case of seeds, the discussions are continuing. Both sides agree that seed sharing is the “best practice”. The question is: should this best practice be merely encouraged or enforced?

This arises with free software, where releasing source code is considered “best practice”, but some licenses not only encourage but also enforce this best practice. When a clan or even a family considers a particular knowledge too sensitive for common access, they probably try to retain control over its spread by keeping it secret. Thus, certain preparations of medicinal herbs may be kept within a clan or a family of healers. It would certainly be unacceptable to extract this information through force. Of course, the burden of keeping the knowledge secret lies on the shoulders of those who keep it. Should the information leak out, control and access then passes on to the community. Perhaps a similar approach, which requires no resort to copyright law enforcement, will work with free software source code.

It is interesting to note that in the case of free/open source software (FOSS), the situation is developing in the direction of a gradually growing island of free source code emerging in a sea of closed proprietary systems. In the case of seeds, it is the other way around, with islands of proprietary varieties and gene sequences emerging in a sea of free, open seeds. Depending on which way things eventually go, we can actually see in one the future of the other. Perhaps FOSS advocates can learn from the millennia of farmers’ experience in varietal development, seed sharing and exchange and how these practices can be strengthened or undermined.



Perhaps software developers can learn from the way in which traditional healers release or withhold information.

Farmers might learn lessons from the FOSS movement and how it has managed to go against the tide of expansion of closed proprietary systems and to create a counter-current of support for free, open source software. Is it the existence of a strong and dynamic community of developers sharing their knowledge freely that farmers lack? Or is the erosion of farmers’ rights to share and exchange seeds due mainly to corporate seed suppliers having captured regulatory agencies, whose policies have been invariably friendly to further privatisation in the seed industry? When the big software houses get better at regulatory capture, can they get the State to adopt measures against FOSS too?

A matter of balance?

The language of FOSS is expressed in terms of individual freedoms: the freedom to use, to copy, to study, and to modify software. Debate revolves around balancing the freedoms of the user over the freedoms of the developer, or the freedom of one developer versus the freedom of another developer. Such an approach is perhaps consistent with the US heritage based on the libertarian struggle for individual freedoms. In such a context, where individual freedoms clash and the assertion of one set of rights conflicts with another set of rights, one needs recourse to a superior body such as the state to ensure proper balancing or enforcement. Unfortunately, when the state is captured by monopolistic forces, its apparatus is turned from a mechanism of balancing conflicting rights to one of enforcing statutory monopolies.

The language of indigenous knowledge systems is expressed more in terms of individual responsibility to the community. The word that probably expresses this best is the word “sharing” – when an individual work merges with the community storehouse of knowledge. The focus is on the individual’s contribution to the common good. From this perspective, “shareware” was, in a way, onto the right idea: software that was meant to be shared. Unfortunately, instead of simply appealing for voluntary payments for their intellectual work, shareware authors tended to cripple their work with time- or feature-limitations unless payment is received, giving shareware – despite some excellent exceptions – its distinctive feature.

Likewise, FOSS approaches closely the concept of contributing to the community’s storehouse by sharing one’s knowledge (i.e. source code), though it uses the unfortunate language of rights and the threat of copyright enforcement to realise source code-sharing. In the process, it sacrifices the ideal of voluntary, culture-driven sharing with



the more immediately effective but double-edged, rights-based approach predicated on copyright enforcement. Its advocates should perhaps consider source-code sharing as “best practice” but leave the final decision to the individuals who contribute to the software pool. This is consistent with both concepts of individual freedom and community sharing. Still, the transition to this approach from its current threat-based approach based on copyrights laws needs to be well thought out.

For knowledge systems that take multiple generations to develop and are an accumulation of countless of individual contributions, it is perhaps understandable that individualist thinking gives way to collective perspectives. Software development has shorter life cycles, and individual contributions may form a significant part of a software system. The relationship between the individual and the community for modern systems like software compared to traditional resources like seeds may find their balance at different points.

In addition to the issues of freedom and responsibility and of enforcement and encouragement, another major area where balancing is needed is in the tension between commerce and culture. Most traditional knowledge systems evolved outside the context of markets. In fact, the emergence of markets often signals the beginning of the end for free sharing and the culture that surrounds it, and its replacement by the culture of commerce and competition. When competition becomes paramount and some become more successful than others, can monopoly be far behind?

The debate around the commercialisation of indigenous cultural artefacts and practices reveals a deep concern that merging indigenous cultures with modern commerce will eventually undermine the very basis of indigenous cultures, which are founded on concepts of community sharing.

So it is valid to ask if, instead of asking traditional systems to cross over to modern commercial practices, we can instead ask modern systems to embrace age-old and time-tested practices of free sharing. Because information, knowledge and culture are non-material and intangible, and sharing them does not mean losing them, this is an area where the economics of scarcity, including current concepts of property ownership based on material wealth, break down. Perhaps, we should be looking for a balance between commerce and culture, between individual pursuit and collective sharing of wealth, not only among indigenous societies but also in modern society.



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Conclusion

In the fields of information, knowledge and culture, exclusionary and monopolistic approaches which rely on state enforcement mechanisms to implement exclusionary provisions should be considered “worst practice”. Our long-term goal should be to phase them out in favor of non-monopolistic rewards for intellectual work. On the opposite side of the spectrum, free sharing of source code, seeds, knowledge and culture are “best practice”. Copyrights and patents are doubly-bad not only because they create monopolies through force or the threat to use force, but also because they ban the “best practice” activity of free sharing.

A rich selection of policy options is available to society for discouraging bad practices and encouraging good ones. The challenge is to find the policy option that is most appropriate for each practice, balancing the considerations of freedom and responsibility, enforcement and encouragement, and commerce and culture, while ensuring that each policy option works in harmony with the intangible, non-material, non-rivalrous nature of information.

