The Knowledge Society: a freedom-centered perspective

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Introduction

The Indian Nobel Prize winner in Economics Amartya Sen defines freedom both as an objective as well as instrumental to reach that objective. He says: ‘freedoms are not only the primary ends of development, they are also among its principal means’ (Sen, 1999). Thus, the advancement of human freedoms defines development. Sen distinguishes different forms of freedom:

1. political freedom, including freedom of expression and association,
2. economic facilities,
3. social opportunities,
4. transparency guarantees and
5. protective security.

These freedoms have in some form or another been laid down in the Universal Declaration of Human Rights[2].

While these freedoms are indeed fundamental for any free society, as we will see in this article some of these freedoms are sacrificed for the sake of ‘intellectual property’. The freedom of expression is more and more limited by exclusive ownership of imagery and expressions which in the past were in the Public Domain but are nowadays controlled by Copyright Law. The freedom to work in favourable conditions and with traditional practices in agricultural communities is more and more limited by patents on plants, seeds and micro-organisms.

The Internet has the potential to enhance the freedoms of thousands of millions of people around the world. It has enabled new forms of relationships, with less intermediaries, and has allowed people to cooperate with others with a shared interest in for profit or for benefit projects on an unprecedented scale. Although many people are still excluded from this technology due to computer illiteracy, financial poverty or political suppression, over 1,5 billion people worldwide had access to the Internet in 2009.

1The authors want to acknowledge the comments and final reading by Franco Iacomella, companion in many free knowledge activities. Many thanks go to Hans Sleurink, Jan Stedehouder and Jan Willem Broekema, for their suggestions for the outline and valuable feedback to improve the article.

2Adopted by the General Assembly of the United Nations, 1948, http://www.un.org/en/documents/udhr/

There has been much discussion in recent years about the Information Society, the knowledge economy, network economy, postindustrial society, post-scarcity society and a large etcetera of terms to indicate the ‘new’ times in which we live. In fact, almost any self respecting country has its own government department and policies for it. We might wonder however how new the Information Society is, what were it's original premises as formulated by policy makers and later how the development of the Internet changed so many things, including these policies. By studying these questions, even if briefly, we hope to put in perspective the current debates around the Internet and the ownership of knowledge.

Several debates and policy initiatives related to the Internet or the Information Society at large are taking place around the globe. Some of these are conducted by policy makers, the entertainment industry or service providers without much public debate with other concerned actors. Without the intent to be complete, we can mention various different efforts, such as those to restrict the access to P2P (peer-to-peer) file sharing services, the use of Deep Packet Inspection (DPI)[3], attempts to damage net neutrality, initiatives to refrain people from digitalising books, limitations on the publication of orphan works[4], the use of patents in publicly funded research, the widespread acceptance of software patents, the violation of privacy and abuse of personal data, etc.

In this article we will briefly explore the rise of the Information Society and argue for a knowledge society that encourages individual freedoms while not diminishing others. We question some of the efforts to bring the Internet under control by specific interest groups. Some of those groups are at the same time firm advocates of increasingly stronger copyright and patent regimes. The need for such state granted monopolies is discussed from a critical point of view to review whether the granting of such strong monopolies is justified in order to achieve the declared goals.

We will discuss several methods for the production of Free Knowledge and we will explain why society at large benefits from Free Software, Open Educational Resources, Open Hardware and Open Access to scientific knowledge. We will also describe the main movements for free knowledge, grouped along three strategic lines. Though there are many differences in how each envisions the best way to get towards such free society based in the sharing of knowledge, we can distill a series of common values. Finally, various reforms are presented which in our view are needed in our transitioning societies.

About the Information Society

Information has become predominant in virtually all sectors of society. While the so called ‘Information Society’ is often considered a new development, its origins can be traced back to at least the times of the industrial revolution. In fact, with industrial production taking a hold on the Western world in the late 18th century, the need to have information on resources, providers and customers became apparent. At the same time, technological developments like the telegraph enabled the transmission of such information at a speed and over distances never seen before. Not only was this development directly relevant for industrial development, including the military, it also made possible the rise of mass democracy. It should be noted that information processing is not only part of Western history but of many cultures and past empires. However, the model of ownership and privatisation of information and knowledge which has come to dominate knowledge production in a globalised market is a Western one. In this article we might therefore be Western-centric to trace the origins of the current information society.

3DPI enables advanced network management, user service, and security functions as well as Internet data mining, eavesdropping, and censorship. The technique can be used to filter Internet traffic on transmission of copyrighted material.
4Orphan works: i.e. their authors or inheritors cannot be traced.

The Information Society and its Initial Policies

Let us first look at the term ‘information society’. The first author to contemplate the new society was Daniel Bell, who in the late 1950s called it the Post-Industrial Society (Bell, 1974). Bell considers the novel and central feature of post-industrial society to be the ‘codification of theoretical knowledge and the new relation of science to technology’, opposing the abstract, general knowledge to the practical, applied know-how that characterised industrialism. Although every society has existed on the basis of knowledge, in the 20th century we have seen the ‘codification of theoretical knowledge and the development of self-conscious research programs in the unfolding of new knowledge’. Other terms used by various authors are post-modernism (e.g. Jean Baudrillard, Mark Poster, Paul Virilio), flexible specialisation (e.g. Michael Piore and Charles Sabel), the informational mode of development and the network society (Manuel Castells). Frank Webster suggests that the defining criterion of the Information Society is not how information has become so important in our society, which he considers an obvious fact, but rather that the character of information transforms how we live. The suggestion is here that theoretical knowledge/information is at the core of how we conduct ourselves nowadays. This definition is especially qualitative in kind (Webster, 1995). Various observers describe today’s global economy as one in transition to a ‘knowledge economy’, focused on the production and management of knowledge in the frame of economic constraints. This term was coined by Peter Drucker. (Drucker, 1969).

In his book, Knowledge Societies (Stehr, 1994), Nico Stehr cites Robert E. Lane as one of the first users of the term ‘knowledgeable society’ (1966). Of the mentioned terms, we prefer the ‘knowledge society’, where knowledge is the primary production resource and Information and Communication Technologies (ICTs) are used to create, share and use knowledge for the prosperity and well-being of its people. The difference between a knowledge economy and a knowledge society is that in the former knowledge is considered a product, while in the latter knowledge is both a tool and an end in itself. Instead of focusing only on economic aspects, a knowledge society involves economic and social processes. The term can be seen as an extension of the ‘information society’, where processing of ‘information’ is at the core of society, while in the ‘knowledge society’, information is part of the process of acquiring, using, adapting, learning, passing on of explicit forms of knowledge.

Discourses about the rise of the Information Society have used terms like ‘new technology’ and ‘global’ to seal off possible controversy. Many promises have been made in this respect to state that we are moving towards a ‘more open', ‘more democratic’ society. As summarised by Armand Mattelart, ‘each new generation of technology revived the discourse of salvation’ Mattelart, 2001). In 1948 Norbert Wiener published Cybernetics or Control and Communication in the Animal and the Machine. He postulated that information, with its potential to de-concentrate and decentralise, would be the origin of a ‘Second Industrial Revolution’, bearing the promise of freedom for the citizenry. Nevertheless, Wiener was also concerned about the trend towards monopolisation and commodification of information sources, and the instrumentalisation of science for military ends. In the corporate world the ideas of management theoretician Peter Drucker have been especially influential. He considered that the rise of information industries and networks would free production managers, consumers and products from constraints of national boundaries and connect them in a single self-regulating market. Drucker combined the ‘knowledge economy’ and the ‘Global Shopping Centre’.

These and various other discourses resulted in some initial policies on the Information Society. Let us briefly mention a few of them for Japan, the USA and Europe. In 1971 Japan adopted a plan to become an 'information society' as its 'national objective for the year 2000'. Part of the plan was to build a tower in the center of Tokyo where the databanks and centers of scientific research and documentation would converge and all the national 'reservoirs of thought', public or private, would be stored. This 'central reservoir of thought' would not only fuel teaching and research, but also guarantee a new system of grassroots participation thanks to free access to information (Mattelart, 2001).

In following years the notion of the knowledge society spread out. A US Senate Committee held its first hearings on the 'information age' in 1977. The report, published under the title "The New World Order" emphasised three main issues: '1) How can the flow of information be increased to better all mankind without impinging upon personal privacy, proprietary data and national security? 2) How can – or should – the Second and Third Worlds' desire to rigidly control information sectors of their societies be accommodated, while trying to allow the free flow of information worldwide? and 3) How can us Government organise to protect our security, cultural and economic interest and also help meet the needs – and gain the cooperation – of the developing nations?' (Kroloff & Cohen: 1997). It is important to notice that the 'free flow of information' refers to the spreading of information that was not 'owned' by Copyright holders.

Al Gore's proposal, in 1995, to build a Global Information Infrastructure to 'abolish the world's great social imbalances' promised a 'New World Order of Information'. It was the consensus of the gathering at the G7 that the building of such information highways should be left to private sector initiative and the virtues of the market. Though some 50 managing directors of world leading electronics firms took part in this historic meeting, no representatives of civil society were invited to attend.

The promise of information highways was expressed in the 1997 Green Paper on telecommunications[i] which initiated a process of policy making in the European Union. The document recommended the abolition of national monopolies and raised the question of using information networks as a potential basis for the construction of a single market.

The European Union developed several programmes (e.g. impact, info2000) to stimulate the use of the information highway by companies. It was in 2000 that the European Council formulated the Lisbon Strategy[5], arguably its most ambitious knowledge society policy to date. Its aim was to make the EU 'the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010'. Most however agree nowadays that the Strategy has failed and renewed efforts are needed. In March 2010 the Commission published its strategy for 2020: Europe 2020[6] A European strategy for smart, sustainable and inclusive growth. This follow-up on the Lisbon Strategy places heavy emphasis on innovation by way of patents and Copyright, although the need to modernise these, as well as interoperability, are mentioned. One of its key initiatives is the European Digital Agenda, carried out by European Commissioner Neelie Kroes. She declares collaboration to establish open standards and interoperability 'a matter of enlightened self interest' (Kroes, 2008).

All these strategies and discourses attempt to link certain technological developments, especially in ICT, with political, economic and social change.

5See http://europa.eu/scadplus/glossary/lisbon_strategy_en.htm
6See http://ec.europa.eu/eu2020/index_en.htm

Public Domain under threat

While the Internet and other networks facilitate access to information and works of authorship, ‘Centralised Media’ (as David Bollier calls the big corporate publishers, music labels, movie studios) or ‘Big Media’ as James Boyle calls them, see their position in the market threatened and are afraid of losing control over their products. In his book called "The Public Domain: Enclosing the Commons of the Mind" James Boyle (2008) presents the ‘Internet Threat’, which is the way of thinking that Centralised Media use to justify continuing their grip on power. The Internet Threat, he explains, ‘is beguilingly simple. The Internet makes copying cheaper and [so Big Media] must meet the greater danger of illicit copying with more expansive rights, harsher penalties, and expanded protections. (...) without an increase in private property rights, cheaper copying will eat the heart out of our creative and cultural industries.’

In the 20th century Centralised Media have used copyright as the main tool to control their products. Every time Walt Disney Corporation was about to lose exclusive Copyright on Mickey Mouse to the Public Domain, through their strong influence on the political system they made sure the Copyright term was extended, in what is now popularly named as the "Mickey Mouse law". What initially was 14 years of exclusive rights, nowadays is 75 years after the death of the author or 95 years for corporations[7]. In April 2010, the Dutch Council for Culture stated that because of these Copyright regulations the 20th century is digitally not present in museums and libraries in Europe and urges to ensure access to knowledge for all citizens by using alternative models for copyright[8]. Besides the duration, Copyright has been introduced for many other fields of endeavour such as software, design, etc. and its application has been widened. All these trends of maximising Copyright extension as if it were an absolute right, for which its proponents are also called ‘maximalists’, have one big victim: the Public Domain.

The Public Domain, the public sphere containing ideas, facts and all those works which are not any longer under Copyright, or never were, loses several times. First, when copyrights are extended retrospectively: there is clearly no additional incentive for authors when copyrights are extended for existing works. Second, a large fraction of works which are still under Copyright are ‘orphan works’, i.e. their authors or inheritors cannot be traced. Society at large loses by not being able to use those works, while their authors can’t benefit from the copyrights. Thirdly, society loses all those works that are under Copyright, but whose owners have no intention of keeping them accessible. Even nowadays with digitalisation techniques and publication and distribution costs relatively low, many old movies from the early days of cinema and old or recent books are out of publication: the Copyright holders won’t publish them or allow others to do so.

The value of the Public Domain is generally much underestimated, although according to Pamela Samuelson, recognised by many as a pioneer in digital Copyright law, intellectual property, cyberlaw and information policy, it provides the building blocks for the creation of new knowledge, it enables follow-on innovation, it provides access to cultural heritage, supports learning, facilitates low cost access to information without the need to locate and negotiate rights clearance with the Copyright holder, it promotes public health, democratic processes and enables competitive imitation.

7Copyright Term Extensions Act, 1998
8Dutch Council for Culture. Advies Netwerken van betekenis. See www.cultuur.nl/files/pdf/advies/ advies_2875dcd4-9148-12a9-42f1- 0000214fd1b5_advies_e-cultuur.pdf

Copyright maximalists invest serious efforts in controlling the knowledge society and the Internet both through changes of the legal systems and technical measures. Some examples of the former are the Copyright Term Extension Act to extend copyright terms by 20 years and the Digital Millenium Copyright Act (DMCA), both approved in the USA in 1998. The DMCA criminalizes production and dissemination of technology, devices, or services intended to circumvent measures that control access to copyrighted works, commonly known as Digital Rights Management (DRM) or Technical Protection Measure (TPM). It also criminalizes the act of circumventing an access control, whether or not there is actual infringement of copyright itself. In addition, the DMCA heightens the penalties for copyright infringement on the Internet. In 2001 the European Union passed the Copyright Directive or EUCD, which addresses some of the same issues as the DMCA.

Centralised Media have recently been lobbying intensely for two other changes to bring the internet further under control. The first is to allow network operators to selectively block content or services or degrade their quality: this would allow them, for example, to block p2p filesharing, damaging the principles of Net Neutrality and e2e (end-to-end) communication which are at the heart of the Internet infrastructure. Closely related to this, the practice of Deep Packet Inspection (DPI) allows service providers and governments to indiscriminately analyse and filter network traffic based on its content, allowing Copyright enforcement, discrimination of peer-to-peer protocols, eavesdropping and censorship. The second recent initiative in this direction is ACTA, an Anti-Counterfeiting Trade Agreement negotiated in secret by the EU, US, Japan and other countries. ACTA will contain a new international benchmark for legal frameworks on the enforcement of copyrights, trademark rights and patents, among others. After several drafts were leaked through WikiLeaks[9], including the full consolidated text of the ACTA in March 2010, the pressure of public opinion increased, forcing the participants to make a draft available to the public in April 2010. Apart from anticounterfeiting measures, the proposed agreement would harm Free Software development, give patent dealers free reign and limit access to medicines. Both the European Parliament and the EU Member States have vetoed concrete aspects of the ACTA.

Examples of the technical measures to control users are proprietary file formats, like Apple allowing users to play their music, restricted by DRM, on a limited number of devices; copy protection on CDs and DVDs; zoning DVD’s, allowing you to only watch the DVD’s you bought in your region; Trusted Platform Computing, enabling software and hardware of your computer to restrict you from making certain uses if you cannot show the license for that use, and DRM.

About Intellectual Monopolies

‘*The purpose of copyright and related rights is twofold: to encourage a* dynamic creative culture, while returning value to creators so that they can lead a dignified economic existence, and to provide widespread, affordable access to content for the public.’

World Intellectual Property Organization

Under the name of Intellectual Monopolies we consider different types of state granted monopolies, which are often referred together as ‘intellectual property’, but we favour the term ‘monopolies’ because it conveys better the legal nature of these rights, which are fundamentally different from property rights over material goods.

9WikiLeaks is an organisation that publishes anonymous submissions and leaks of sensitive documents from governments and other organisations, while preserving the anonymity of their sources. See http://wikileaks.org/

A short history of copyrights and patents

Most legal systems nowadays recognise three different kinds of intellectual monopolies: trademarks, copyrights, and patents. Trademarks, for example signs to exclusively distinguish products or services, are different in nature from copyrights and patents. Copyrights apply only to expressions, and not to ideas, procedures, or methods of operation, while patents apply to specific implementations of ideas. A brief history of copyrights and patents, both subject to debate and controversy, is discussed here.

Copyrights

As Gutenberg's invention of the mechanical printing press in the 15th century became widely used in Europe and the rest of the world, governments wished to control the new products made possible by the printing press. Before the printing press, a book, once created, could only be copied manually. The new way of printing allowed for multiple exact copies of a work, which consequently led to a quick, widespread circulation of ideas and information. While governments and church encouraged printing, respectively because of the dissemination of government information and bibles, more critical works could also circulate rapidly. As a consequence, governments established controls over printers across Europe. Licenses to produce, buy and sell books became required.

These early forms of Copyright were tools of censorship and monopoly privileges handed out by the king to maintain control over his subdued. These licenses were given to printers for a fixed period of time, and they granted the printer exclusive rights to print a particular work. This development started in 1557 when the Stationers' Company received a Royal Charter in England. It held a monopoly over the publishing industry and was officially responsible for setting and enforcing copyright regulations until the passage of the Statute of Anne. The British parliament enacted 'an Act for the Encouragement of Learning, by vesting the Copies of Printed Books in the Authors or purchasers of such Copies, during the Times therein mentioned' in 1709 and the Statute came into force on 10 April 1710.

The Statute was concerned with the reading public, the continued production of useful literature, and the advancement and dissemination of education. The Statute furthermore created a public domain for literature, as previously all literature belonged to the booksellers forever. It placed a time limitation on the monopoly enjoyed by holders of a copyright and granted exclusive rights to an owner for fourteen years, which could be extended by the author, if still alive, by another fourteen years. The rights on books already in print were set to 21 years.

Thomas Jefferson (1743 – 1826), one of the framers of the US Constitution and third President of the United States, was well aware that for government to issue monopoly privileges to authors or inventors a balance should be stricken between the incentive provided to authors and inventors and the benefits of society at large. In fact he was rather critical of issuing such monopolies, when he said: 'Society may give an exclusive right to the profits arising from [inventions], as an encouragement to men to pursue ideas which may produce utility, but this may or may not be done, according to the will and convenience of the society, without claim or complaint from any body. Accordingly, it is a fact, as far as I am informed, that England was, until we copied her, the only country on earth which ever, by a general law, gave a legal right to the exclusive use of an idea. In some other countries it is sometimes done, in a great case, and by a special and personal act, but, generally speaking, other nations have thought that these monopolies produce more embarrassment than advantage to society; and it may be observed that the nations which refuse monopolies of invention, are as fruitful as England in new and useful devices.' (Jefferson, 1984).

Discussions broke loose when the first copyrights began to expire. Publishers argued that ‘common law copyright’ prevailed, which claims that copyright is a natural right and provides for the same protections anyone would have with actual property. The battle of the booksellers commenced and lasted for 30 years. During this period the arguments for and against the validity of common law copyright were examined and various notable cases, including Millar vs. Taylor (1768) (Deazley, 2006) took place. This case involved the poet James Thomson’s book, The Seasons. A bookseller, Andrew Millar, purchased the publishing rights to The Seasons in 1729. After the copyright’s term expired, Robert Taylor began publishing his own competing publication, which contained Thomson’s poem. The judge assigned to the case sided with the publishers, finding that common law rights were not extinguished by the Statute of Anne. This decision however was made by an English court and did not extend to Scotland, where the battle continued.

The discussions climaxed in a decision on Donaldson vs. Beckett (1774) following the Millar case about the same poem. The House of Lords ultimately rejected common law copyright. Although this decision firmly established that works to which a copyright has expired fall to the Public Domain, the debate itself has resurfaced ever since.

Modern copyright is predominantly shaped by the Berne Convention. The Berne Convention for the Protection of Literary and Artistic Works is an international agreement with over 160 countries adhering to it, governing copyright, and was first accepted in Berne, Switzerland in 1886. It requires that members of the Berne Union recognise the copyright of works of authors from other signatory countries in the same way it recognises the Copyright of its own citizens. The agreement also requires its members to provide strong minimum standards for copyright law. The World Intellectual Property Organization's Copyright Treaty was adopted in 1996 to address the issues raised by information technology and the Internet, which were not included in the Berne Convention.

Patents

The history of patents laws is generally considered to have started in Italy with a Venetian Statute of 1474. Patents, however, did exist before this statute. Already in 500 bc, in the Greek city of Sybaris, ‘the profits arising from which were secured to the inventor by patent for the space of a year.’

Patents in the modern sense do originate in 1474, when the Republic of Venice enacted a decree that inventive devices had to be communicated to the Republic to obtain the right to prevent others from using them. England followed with the Statute of Monopolies in 1623, which provided strict rules on the circumstances in order to give exclusive rights to an invention. The Statute of Monopolies was later developed by the courts to produce modern patent law, and was soon adopted by other countries.

In the United States, the Patent Act of 1790 was the first patent statute ‘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’. Under current US law, the term of a patent is 20 years.

In 1883 one of the first intellectual property treatises was signed: the Paris Convention for the Protection of Industrial Property. As a result of this treaty, intellectual property, including patents, of any contracting state are accessible to the nationals of other states party to the Convention. This Convention has been the basis for later patent legislation in many countries.

In Europe, the European Patent Organisation was institutionalised in 1977 to provide an autonomous legal system according to which European patents are granted. However almost all features of such a patent, e.g. ownership, validity, and infringement, are determined independently under national law. Since the 1970s, there have been discussions towards the creation of an European Union-wide patent.

The next big step in the globalisation of copyright and patent regimes was the conclusion of the TRIPS agreement in 1994. The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) is an international agreement administered by the World Trade Organization (WTO) that sets down minimum standards for many forms of intellectual property regulation as applied to nationals of other WTO Members. Since most countries are member of the WTO or are willing to become one, TRIPS has far reaching consequences. Countries are not allowed any more, or only very limited, to make exceptions to meet their own needs. 'TRIPS was the first stage in the global recognition of an investment morality that sees knowledge as private, rather that public, good.' (Drahos, 2002). It mandates that every country has a copyright law that protects computer programs as a literary work, as well as patent law which can include micro-organisms and microbiological processes. 'The standards of TRIPS will profoundly affect the ownership of the 21st century's two great technologies - digital technology and biotechnology,' says Peter Drahos.

A critical view on intellectual monopolies

We have seen that copyrights and patents have been justified 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'. As Thomas Jefferson warned clearly already two centuries ago, such state granted monopolies should be balanced. In the case of the extension and broadening of copyrights, many questions can be asked. The basic economic model for 'intellectual property' maximalists is 'If you give me a larger right, I will have a larger incentive to innovate. Thus the bigger the rights, the more innovation we should get.' (Boyle, 2008). But is that really so? A close look at the development of several sectors reveals that such strong rights do not generally increase productivity levels (Boldrin & Levine, 2008). To name an example in the area of agriculture, studies of crop yields for US corn show that the bulk of yield growth took place when patents on plant life were impossible or non-existing and when patents were introduced, the total output has been remarkably constant or even decreased. 'The creator of innovation is also always the borrower of ideas and information from others. (…) Raising the costs of borrowing through the imposition of very high standards of intellectual property will progressively choke innovation, not increase it.' Most businesses will be losers, not winners, as Drahos (2002) and Braithwaite argue in Information Feudalism.

In the case of intangible goods like ideas and knowledge, their diffusion doesn't harm the initial inventor or author. By exchanging ideas, they multiply and can get better. With physical goods this is not the case. The difference between intangible and physical goods shows clearly the fallacy of the 'piracy discourse'. Taking someone's boat from him is rather different than copying or imitating an idea or digital file. Apart from that, philosophical questions exist on whether ideas can really be owned and furthermore whether ideas can be original at all. In case of doubt, we suggest to err on the side of freedom: everyone can own his or her copy of an idea, but we'd rather put no unnecessary restrictions on others, i.e. don't limit learning, creativity, innovation.

In any case, the question remains whether people still need an incentive such as exclusive control provided by the state over the idea or expression in order for them to develop and spread them. We will discuss the view point of Joseph Schumpeter and then see a few counter arguments.

The Austrian economist Joseph Schumpeter is considered one of the most influential economists in the field of innovation. In his work "Capitalism, Socialism and Democracy" (Schumpeter, 1962) he introduced the term ‘creative destruction’ to describe innovative entry by entrepreneurs as the force that sustained long-term economic growth, even as it destroyed the value of established companies that enjoyed some degree of monopoly power. Because of the significant barriers to entry that monopolies enjoyed, newcomers would have to be radically different, thus ensuring that a fundamental improvement was achieved, not a mere difference of packaging. The threat of market entry would keep monopolists and oligopolists disciplined and competitive, ensuring they invest their profits in new products and ideas. Schumpeter believed that it was this innovative quality that made Capitalism the best economic system. He assumed that unless the innovator believes that it will be possible to monopolize the advantage of innovation for a time, innovation will seem too risky. ‘Perfectly free entry into a new field may make it impossible to enter it at all. Compare patents, which encourage invention by promising inventors a temporary monopoly. The introduction of new methods of production and new commodities is hardly conceivable with perfect - and perfectly prompt - competition from the start’.

Professors of Economics Michele Boldrin and David Levine wonder whether patents and copyrights are indeed essential to thriving creation and innovation (Boldrin & Levine, 2008). They study several market sectors and analyse competition, innovation and intellectual monopolies both empirically as theoretically and conclude that these state granted monopolies as well as restrictive licensing agreements are not at all necessary nor desirable. In fact, looking at the history of certain markets, it can be concluded that new markets in the past at least, have started without the protection of monopolies and when markets matured, patents were introduced to maintain the status-quo. Surveys under product and process innovation managers show that companies indeed choose to use patents mainly for avoiding new entrants to come into ‘their’ markets[10].

Even the steam engine, as generally understood to be developed by James Watt, experienced a serious delay in development due to the patent granted to Mr. Watt. Only after his patent – granted on a small improvement of the engine that had been developed by other inventors – had expired, the real leaps in productivity were reached by follow-on innovators. Watt forced his competitors to license his patent under the threat of bringing them to court. One could argue that the industrial revolution was delayed by a decade or two just due to this patent. But even without going into such extremes, this little story suggests that Mr. Watt’s contribution to the legal practice of making a living from patent rents might have been greater than to the development of the steam engine.

The harm patents do can be seen from several arguments against intellectual monopolies. Economists and citizens alike are suspicious of monopoly. The traditional economic analysis of monopoly emphasises the welfare triangle – the loss of efficiency due to the fact that monopolies create artificial scarcity to garner a higher price. The political economy literature stresses the rent-seeking nature of monopolies, especially of government granted monopolies: they distort the political system by purchasing favourite treatment at the expense of everyone else, thereby wasting away a substantial fraction of the social surplus[11].

10The Carnegie survey in 2000 among 1118 firms for product innovations and 1087 for process innovation shows that legal means, including patents, are considered as the least effective method of appropriating rents, and indeed secrecy, lead time and complementary products and services are much preferred.

11As Lessig, Boyle and others have shown, the Copyright Extension Acts are a clear example of this: every time a big copyright holder is about to lose its copyrights, they lobby governments to extend copyright terms.

The case of Copyright is quite distinct from patents, though the granting of temporary monopolies and in consequence the limitation of competition is also here applicable. An important problem with Copyright that many authors have identified is that it is neither fair in balancing incentives for authors nor does it do much good for the society at large. Economic research shows that from the income based on copyrights, only 10% of the artists capture 90% of the revenue. Such winner-takes-all market is focused on bestsellers, blockbusters and superstars (Smiers, 2009).

While Schumpeter expected no one to enter the market if there would not be a monopoly advantage for the entrepreneur, economic reality and more recent economic theories contradict him. Schumpeter assumes that when an imitator enters the market, costs would to go to marginal costs and no profit remains. In his view, without patents, this would lead to a stationary state (of no growth), as enterpreneurs would not be inclined to innovate. This assumes that imitation is in fact costless. Amazingly enough many innovations happen without patents, which forces the question of why an imitator would enter if there is no money to be earned. In fact imitators often need to invest considerable time and resources before they can enter the market with an imitated product. And the first mover has generally an important advantage to obtain return on investments in the first period until competitors enter the market. This shows that Schumpeter's assumption of perfectly free entry into a new field is not correct.

Production of Free Knowledge

This new freedom [the freedom to take a more active role in a new information environment] holds great practical promise: as a dimension of individual freedom; as a platform for better democratic participation; as a medium to foster a more critical and self-reflective culture; and, in an increasingly information-dependent global economy, as a mechanism to achieve improvements in human development everywhere.

Yochai Benkler (2006)

The rise of the Internet in combination with information production can been seen as the removal of a material barrier for the access to knowledge and has led Benkler to make three important observations. First, on-proprietary strategies in information production, education, arts and sciences should become even more important to the information production system. Second, outreach is available to anyone connected to the Internet and individuals can reach and inform millions around the world. Thus, the impact one individual can have suddenly grows enormously. And third, it causes the rise of effective, large-scale cooperative efforts for the production of information, knowledge, and culture.

Commons-based peer production, a term coined by Benkler, is a model of economic production in which the creative energy of large numbers of people, self-organised in communities, is coordinated into large, meaningful projects mostly without traditional hierarchical organisation. Michel Bauwens, a Belgian P2P theorist, treats these phenomena as an emerging alternative to capitalist society. He however also adds that market economies and peer production are dependent on each other: 'peer production produces use-value through mostly immaterial production, without directly providing an income for its producers' while '[c]apitalism has become a system relying on distributed networks, in particular on the P2P infrastructure in computing and communication.' (Bauwens, 2005).

Definition of Free Knowledge

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Free Knowledge is explicit knowledge made available granting every person
the freedom to use, study, adapt, copy and distribute. ‘Explicit knowledge’
is knowledge captured on some medium, usually in a form representable on a
computer, like text,sound, video, animation, executable program, etc.
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It is plain to see that society as a whole benefits from production models that allow for the unencumbered sharing of knowledge. These models make knowledge more accessible and enable new ways of collaboration and collective creation. But how do people make a living from the production of Free Knowledge? How do individuals and companies make profit from producing or just using Free Knowledge? We can distinguish different models in different sectors. Some of these have been used for decades, while others are just emerging. One of the most important ones is Free Software, for many reasons: its scale, the number of actors it involves, its relevance in the history of the Internet and its economic sustainability. However, there are examples in many other sectors. We will review some of these briefly.

Free Software: from the realm of hackers to a mainstream industry

Until the end of the 1970s computer programs, especially at universities, were copied and modified without restrictions, just like any other piece of academic knowledge. The developers of these programs called themselves 'hackers', passionate about solving problems in exchange of the recognition from the rest of the community. But in the early 1980s, companies who distributed software began preventing users from sharing these programs or the improvements they made, in a way that was very similar to the distribution of proprietary software nowadays. Making copies of a program had become illegal, and the only company that distributed it could make changes to it.

In this context emerged the Free Software movement, initiated by Richard Stallman. As a reaction to the growing restrictions in the software industry, he founded the Free Software Foundation to defend the freedoms of users and developers. They defined Free Software[12] (Stallman, 1986) as software that grants its users these fundamental freedoms: the freedom to run the program for any purpose, the freedom to study the program and modify it, and the freedom to redistribute copies of the program, with or without modifications. Access to the source code of the program is a precondition for these freedoms.

In the last 25 years, Free Software has evolved from a minority movement of hackers to become a thriving ecosystem of applications that are collectively developed and maintained by a wide range of individuals and organisations: IT companies, public institutions, professionals, hobbyists, etc. Nowadays this movement constitutes one of the best examples of the emerging modes of collective construction of knowledge. Some of the most successful Free Software projects are the GNU/Linux operating system, which has become a real alternative to other platforms in a wide range of devices from supercomputers to mobile phones; the Apache web server, which powers the majority of websites in the Internet (55% as of March 2010 according to Netcraft[13]); and OpenOffice.org, a Free Software alternative to the Microsoft Office suite. Many companies make profit by providing services around Free Software such as training, customisation, maintenance, etc., or just saving money by using Free Software to provide other services.

12 See the complete definition: http://www.gnu.org/philosophy/free-sw.html
13See http://news.netcraft.com/archives/web_server_survey.html

Open Educational Resources

Open Educational Resources (OER) are learning materials that are freely available for anyone to use, and that allow for different actors to collaborate in their development and maintenance. It's definition is commonly associated with UNESCO. The societal benefit of OER is very well stated in the Cape Town Open Education Declaration[14]: 'These resources (...) contribute to making education more accessible, especially where money for learning materials is scarce. They also nourish the kind of participatory culture of learning, creating, sharing and cooperation that rapidly changing knowledge societies need.'

As happens with Free Software, new service-based business models emerge in the absence of artificially imposed scarcity: training companies share their materials to reduce the effort of keeping them up to date, educational institutions give their educational resources for free and offer tutoring and accreditation for a fee, learners help maintaining the learning materials they use as part of their course activities, etc. Finally, self-learners greatly benefit from the availability of high quality learning materials.

Open Access

The Open Access movement brings to the field of academic publications the ideas of knowledge sharing and open publication. It is widely accepted in scientific communities that the state-of-the-art is advanced by building upon the work of others via publication and citation, sharing research results and publishing them in peer-reviewed media. Although scientific knowledge has become accessible to a growing number of people through the Internet, its full potential has yet to be exploited by enabling the process of discovery, usage and furthering of scientific knowledge. The Open Access movement has proven its success in making scientific research more visible and accessible: Open Access articles receive between 3 and 6 times more citations than articles published in non-OA journals (Harnad & Brody, 2004).

The main requirements for a contribution to be considered Open Access are that it removes all price barriers for the users to access it, given the user has an internet connection, and that it removes enough permission barriers to support all the uses customary in legitimate scholarship. The only constraints an author can pose should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.

Open Access to scientific results can justify public funding for science and research much better, as this knowledge can be much more effectively disseminated and used to enhance the general welfare. It also lowers the barriers for scientists in developing countries, allowing them to become full participants of the scientific community.

Open Hardware

Open Hardware applies the main concepts of Free Software to hardware design. The term usually means that information about the hardware is open to all, including the hardware design as well as a free approach to the software that drives the hardware. Graham Seaman, a freelance developer, established three conditions in 1998 to fully qualify as 'open hardware':

1. The interface to the hardware must be explicitly made public, so the hardware can be used freely.

14See http://www.capetowndeclaration.org/

2. The design of the hardware must be made public, so that others can implement it and learn from it.

3. The tools used to create the design should be free, so that others can develop and improve the design.

Open Hardware allows for new production models where companies can share the costs of the design phase and compete in the production of the actual devices. While this can be a very efficient model, big players in the hardware industry are not likely to adopt such a model unless they were placed under heavy pressure from the market. This could happen, for example, if a novel device where to be designed in this way so that competitors were forced to either design it again from scratch or participate in the existing open design. Most successful examples of Open Hardware are found in computing: microprocessors like Opensparc, initiated by Sun Microsystems, leon, created by the European Space Agency, the OpenBook netbook case published by via and the One-Laptop-Per-Child netbook (OLPC), which runs free software and is Open Hardware - and as such is reused by others to produce variants of these little laptops.

Movements for Free Knowledge

Our societies are facing unprecedented challenges in terms of sustainability, on a planetary scale. Global economic, social and environmental issues are affecting each and every one of us in real terms. These issues are interrelated and inherently complex, requiring attention at international and local levels, the pooling of knowledge from diverse sources and across cultures for innovative, sustainable solutions. Current Copyright and patent legislations are hindering these efforts, and this will only get worse with the ongoing attempts to expand these restrictions and limit individual freedoms in the Internet.

A growing movement of critical thinkers, activists, researchers, economists, legal scholars, artists, business people, educators and policymakers are drawing attention on the problems of current legislation and point to the thriving communities of all sorts that are based on sharing of co-produced works under non-exclusive conditions. This movement can be referred to as the Free Culture movement, the Free Knowledge movement or various forms of ‘open’ and ‘free’. Under the name of ‘Free Knowledge movements’ we can include many different organisations and schools of thought that share a common interest in removing obstacles for the production and dissemination of different forms of knowledge. These movements include, among others, users and developers of Free and Open Source Software, net neutrality defenders, advocates of Open Access to academic literature, initiatives to strengthen the Public Domain, groups aiming to assure privacy and anonymity, etc.

Among the several platforms and meeting places that bring together these movements, a relevant event took place in Barcelona from 30 October till 1 November 2009: the Free Culture Forum (FCF)[15]. The FCF consisted of intensive workshops in various working groups, which each produced a set of recommendations and demands for an inclusive, innovative and sustainable knowledge society. The main output that what was collectively produced was a Charter for Innovation, Creativity and Access to Knowledge[16].

While different groups and movements exist we have identified a common set of values and objectives that are shared by most of these groups. From a ‘Free Culture/Free Knowledge’ perspective, these main values are conceived to be crucial for knowledge and expressions of authorship.

15The first edition of the Free Culture Forum Free was organised by eXgae, Networked Politics and the Free Knowledge Institute in Barcelona between 30 October till 1 November 2009.
16See http://fcforum.net/files/chart2.0.1-long.pdf

Equality is one of these values. In a social environment people are not excluded and have equal rights. They have access to knowledge and educational resources and technology. Participants in the knowledge society are valued by their contributions to the common pool of knowledge and build a positive reputation. Authors have the right to attribution. Reputation leads to meritocracy. All individuals are encouraged to participate in the knowledge society, with the same opportunities to contribute to it. Social inclusion, participation and empowerment of all people in our society are seen as the merits of a knowledge society. As a method to optimise resources, it is encouraged to reuse practical knowledge. This approach is economically efficient and sustainability can be achieved. Sharing and cooperation are essential to help each other and get further, as well as collaboration and innovation to find appropriate and sustainable solutions. Cultural diversity is a result of human creativity and part of humanity's collective wealth, and as such it must be promoted and preserved.

Three main strategies

As many different groups with different views and strategies participate in this worldwide movement, we will try to shed some light on the main strategies these groups pursue. With regards to their position on "intellectual property", these movements present three main proposals:

a. The abolitionists

The abolitionists argue for a total abolition of the copyright and patent system. However radical their position may seem to us, they do provide a critical view raising arguments against intellectual monopolies and showing how a world without such monopolies could possibly work. Here we can refer to researchers like Michele Boldrin, David Levine, David de Ugarte and Joost Smiers.

b. The reformers

A second group advocates for reforms of the current copyright system and patent system. While copyright maximalists have been able to extend the duration and widen the scope of copyright time and again, they argue for reducing both duration and scope. In this context the defense and winning back of the public domain is an important debate and part and parcel of the copyright reform. Representatives are James Boyle, Peter Drahos, John Braithwaite, Lawrence Lessig among many others. Active groups and initiatives include: FFII, EFF, Knowledge Ecology International, the Adelphi Charter, The Public Domain Manifesto, Blackout Europe, eXgae, La Quadrature du Net.

c. The commoners

A third strategy is the building of a digital commons, which uses the current copyright system to publish works of authorship under non-exclusive conditions. Copyleft and Creative Commons licenses have enabled the production of Free Knowledge, such as Free Software, Open Access research articles and data, open government data, open standards, open designs, open hardware and many others. In this group we can identify millions of individuals who use and/or contribute to any of the aforementioned movements and projects. Some organisations active in this field are: the Free Software Foundation, Creative Commons, Wikimedia Foundation, Free Knowledge Institute, Open Knowledge Foundation, Fundación Via Libre, Gleducar, the Internet Society, W3C, OpenDoc Society, many universities with OpenAccess and OER initiatives and a large etcetera.

While these strategies are rather different from each other, many groups are contributing to a combination of them. For example the Free Knowledge Institute contributes to campaigns and policymaking debates in the second group, while its core activities lie in the building of the digital commons, of free knowledge which is protected within the current copyright system. The research produced by proponents in the first group helps to question mainstream beliefs about 'intellectual property' and supports the work of the other groups. These approaches all help to reduce monopolies by stimulating competition, collaboration and access to knowledge and are in that sense complementary.

Ten foundations for an inclusive, sustainable and innovative knowledge society

Distilling from the discussions during the FCF we can extract a common vision for an inclusive, sustainable and innovative knowledge society. Although the complete version can be found online[17], the basic preconditions for such society to emerge are identified as follows[18]:

1. Internet

Net neutrality, open and universal access

Internet access is essential for learning and freedom of expression, communication and participation in the knowledge society. An Internet connection that enables sending and receiving content, using services and running applications, connecting hardware and using software is crucial. It is free of any form of discrimination. Citizens have a right to correct, delete, or prevent the transfer of their personal information. Filtering of Internet content is a threat to fundamental rights. Net neutrality is guaranteed. Within the network there are no restrictions on content, equipment or on the modes of communication allowed - while not degrading other traffic.

2. Standards

Open Standards

Open standards are a precondition for technical neutrality. They enable interoperability, stimulate innovation and competition, enable platform independent access to digital information, and facilitate availability of knowledge and learning now and in the future.

3. Software

Free Software

Free software, also referred to as Open Source or Libre Software, enables transparency of information processing. Above all, use of free software is consistent with the free culture values that we wish to transfer to successive generations in the emerging free knowledge society.

4. Spectrum

Free Spectrum

Citizens are entitled to access to a free, unlicensed band of the spectrum for digital communications, such as the analogue tv range and, in general, at least a 25% of any new range of the spectrum that is released in its current use.

5. Knowledge

17An extensive, 'Free Knowledge' version of the Charter of the Free Culture Forum can be found here: http://freeknowledge.eu/wiki/index.php/Free_Culture_Forum_Charter

18This summary has been published with the title Ten Points for Change: http://freeknowledge.eu/10-pointsfor-change.

Aim for free knowledge

•Non-copyrightable works: There should be no copyright on laws, government reports, political documents and speeches, regulatory compliance information, or databases.

•Public domain works: The public domain, as we understand it, is the wealth of information that is free from the barriers to access or reuse usually associated with copyright protection, either because it is free from any copyright protection or because the right holders have decided to remove these barriers. Instead of ongoing privatisation and reduction of the Public Domain, it should be strengthened and expanded.

•Freely licensed works: Every legal system should facilitate and promote free and open licensing to the same extent as proprietary licensing. The results of developments funded with public money should always be published under a free license.

•Orphaned works: There should be freedom to use a copyrighted work if the copyright owner cannot be located after a due diligence search.

•Freely available works: There should be no restriction on the freedom to access, link to and index any work that is already freely online accessible to the public, even if it is not under a free or open license.

•Proprietary works in general: Copyright term should not exceed the minimum Berne term. In the longer term, we support the reduction of existing copyright terms. Copyright terms that are too long do not benefit artists, authors, their audiences or readers, citizens, or society.

6. Patents

Avoid or make freely available

Refrain from applying for patents on the results of publicly funded research. Patents held by public institutions shall be irrevocably released under royalty-free terms and free of any other restrictions.

7. Privacy

Inviolability of privacy and personal data

Citizens have the right to access Internet resources anonymously, know in advance how their personal information is to be used, decide at any time to move, modify or remove their user data from any online service, protect their privacy and encrypt their communications and to choose not to receive unsolicited messages.

8. Transparency

Transparency is a basic requirement for decision making in the public sector and indeed for any collective, community oriented activity. In order to avoid the breach of any fundamental rights (e.g. invasion of privacy, freedom of expression, etc.) there is a need for transparency in enforcement. This must include information on the authorities in charge of the law’s application and on the nature of the obligatory procedures. The government should ensure, through a transparent and public process, the existence of systems of evaluation of how the norms are applied.

9. Economy

Assure income for artists and creators of the free knowledge society

Communities self-organise and self-govern. Exchange occurs according to each person’s abilities and offerings to service mutual needs. Earnings are distributed fairly according to the work carried out.

•There should be diverse sources of support for creative communities including commercial use, direct monetary support by consumers and public investment.

•In order to promote the fair remuneration of artists, the role of intermediaries should all be limited. The role of currently existing intermediaries should be reduced to critical functions such as collecting usage data and the just distribution of remunerations to authors.

•Knowledge, education and innovation are democratised, and production is driven by autonomous initiative and solidarity.

10. Anti-trust, avoid monopolies and reduce dominant market forces

Encourage free competition and diversity by implementing strong anti-trust legislation against monopolies and market dominance. We strive for a level playing field where many more cultural entrepreneurs than nowadays can earn a decent income. Instead of a small number of bestsellers, a much larger number and variety of wellsellers can thrive when market dominance is limited.

Transition

From history we can learn that profound social and economic changes can take a long time. Consider that the philosophical basis for the industrial revolution was laid down about a century before the emergence of the industrial societies in the Western world. Past times have shown that transformations in society never commenced with large institutions. Rather, it was individuals vanguarding these changes, lying the foundations from which a new form of social organisation could emerge and which was followed by these institutions in due time. Now we're about 250 years further and our societies are in transition towards another social and economic system. We see several individuals and certain organisations take a lead and a growing multitude of people practising different forms of free knowledge. It is certainly a struggle of finding the most appropriate way and many steps are still needed. It is however clear to us that fighting the Internet, locking it down in the name of private ownership of little expressions of our culture, is not socially desirable. We are however not arguing for a total abolition of copyright or patents.

We believe that an important reform is needed in the area of anti-trust legislation. The aim of a level playing field with equal opportunities to enter markets and to participate in society requires the reduction of dominant, or even monopolistic, market forces. Joost Smiers proposes to strengthen anti-trust legislation to avoid that cultural conglomerates have a dominant control over the production, distribution and promotion of cultural works, events and performances. One of the instruments he suggests is to reduce cross-ownership, i.e. groups that control the various phases of cultural production.

Furthermore, in this new economy services become considerably more important. When we slowly break down the artificial monopolies on knowledge and intangible goods, people are free to cooperate and compete. In the software domain we already see this happening: while the results of software are publicly available in the case of Free Software, participants earn money with the provision of advice, development, adaptation, implementation and maintenance services. In other fields of endeavour similar patterns of services can be observed. In those areas where encouragement is needed, one could think of making available public or private funds that provide subsidies for the research and development of specific innovations and applications.

Some however argue that subsidies are a wrong incentive and should not be needed, but then again the patent and copyrights granted are a form of government granted subsidies as well. Sure enough, these funding systems do need certain reforms. One of them is, in our view, the introduction of higher standards of transparency, and the requirement that anyone who receives public funding makes the results available without any restrictive conditions. Policies on research should be adapted so that they recognise the benefits of sharing data, analysis and research results, Open Access journals and self-archiving, in order to streamline scientific production and peer review, strengthen the dynamics of scientific debate and the immediacy and quality of feedback. Other forms of funding of socially desirable initiatives can come through subscriptions and collective funding, sometimes called crowdfunding. Donations constitute another relevant example, which is successfully exploited by communities such as Wikipedia and Creative Commons.

For the short and medium term it is our view that strong reforms are needed to bring the copyright and patent system to the service of society at large. At the same time we realise that the power of those who make gigantic earnings through these two systems are not likely to give up or reduce their control. Therefore we see the third strategy as mentioned in the section on Movements of Free Knowledge as the most pragmatic one for the coming years. Indeed many people are building the 'Digital Republic', as David Bollier describes in his book Viral Spiral (Bollier, 2008). In order to help that digital republic to be advanced further and quicker, we can contribute at various levels. As citizens we can actively participate in the community projects of our interest, use them, learn from them and contribute a little grain here and there. Just as examples: listen to Copyleft music, use Free Software, donate to artists, Free Software projects and to crowdfunded movies. As businesses we can profit from the enormous free knowledge resources already available, consequently contribute to and offer services around it. This will help gain a strong reputation for ourselves, and show our commitment to community values, which is more and more appreciated by our customers. As governments we can do what is in the interest of society at large, benefit from what others have made, require the results of public funding to be free knowledge resources and reform our policies to make the use of them our default option. As any social transition, this will cost time, money, patience and people with vision and good ideas. We have no doubt that they are around.

Conclusions

In this article we have briefly walked through the rise of the 'Knowledge Society', where knowledge is produced and transferred in ways and at a speed never seen before. This has implications for the old legal systems of copyright and patents. The market players that have most profited from these legal systems consider this trend as a threat, what James Boyle calls 'The Internet Threat'.

We have briefly reviewed the historical foundations for such state granted monopolies. Copyrights are granted to authors as a temporary monopoly, in order to 'encourage learning' [19], and 'to promote the progress of science and useful Arts'[20]. Schumpeter and followers maintain that patents are necessary to assure innovation. However history has shown us that copyright and patents also have negative effects, such as monopoly formation and market dominance. In recent years both systems have been extended in duration and broadened in scope, which has seriously reduced the Public Domain.

19Statute of Anne, 1709
20US Constitution, 1787

The need for restrictive systems such as copyright and patents appears at least questionable. If we are able to critically explore the production of knowledge and recognise the assumptions and forces behind the copyright and patent systems, we can start to appreciate other forms of knowledge production. We have seen how the foundations for a Free Culture or a Free Knowledge society have been laid in several areas, where many successful examples of collective production of knowledge are already thriving. Free Software, of course, as a flourishing ecosystem of applications. But also Open Educational Resources, an expanding global collection of materials, as they accommodate for different needs to make education more accessible and more effective; Open Access helps to enable the process of discovery, usage and furthering of scientific knowledge; Open Hardware can be an integral means for personalisation, innovation and new economic opportunities.

In recent years many individuals and organisations have started advocating for alternative models of knowledge production. Instead of producing knowledge built on exchange value in the market, based on exclusive control, a culture of sharing and cooperation is emerging. Some call it ‘Free Culture’, as it seeks to enhance the freedom of human beings. However many different movements are active in this domain, and as not all necessarily go along with the term ‘Free Culture’, we have shed some light on the various strategies that different groups pursue in the direction of a Free Culture. These movements vary from the abolitionists and reformers of the current copyright and patent system to builders of a digital commons and supporters of a level playing field. All these strategies have different propositions for the short and long term, but to some extent they work in the same direction. As a general summary we have described the main values that can be found within the Free Culture movement: equality and meritocracy, inclusivity, participation, economic efficiency, attribution of authorship and reputation, sustainability, collaboration and cooperation, innovation and diversity.

The transition towards a new social and economic system does not happen without effort. Strong reforms are needed for the short and medium term, and first off, endeavours at various levels, from citizens to businesses and governments, are required to reach the knowledge society we desire.

There are several important challenges and obstacles to overcome in order to fully realise the potential that these initial infrastructures let us imagine. Equality and freedom are fundamental principles of democracy and are also basic preconditions for a true Knowledge Society. Information and communications technologies enable access to knowledge and higher levels of innovation and inclusivity, enriching the diversity of individuals and groups that are able to contribute and participate. The institutions that were built in the past centuries need to be revised and adjusted to face these new challenges. The foundations of this free, unencumbered knowledge-based society have been laid within the old system; it is now up to us to strengthen the evolution of this new, emerging model.

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