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Reading 3

Title

'The Wealth of Networks: How Social Production Transforms Markets and Freedom'

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The Wealth of Networks: How Social Production Transforms Markets and Freedom

(Excerpted text. Dotted lines indicate snipped passages.)

Yochai Benkler. Yale University Press (2006).

Chapter 9: Justice and Development

How will the emergence of a substantial sector of nonmarket, commons-based production in the information economy affect questions of distribution and human well-being?

> The pessimistic answer is, very little.
>
> Hunger, disease, and deeply rooted racial, ethnic, or class stratification will not be solved by a more decentralized, nonproprietary information production system.
>
> Without clean water, basic literacy, moderately well-functioning governments, and universal practical adoption of the commitment to treat all human beings as fundamentally deserving of equal regard, the fancy Internet-based society will have little effect on the billions living in poverty or deprivation, either in the rich world, or, more urgently and deeply, in poor and middle-income economies.
>
> There is enough truth in this pessimistic answer to require us to tread lightly in embracing the belief that the shift to a networked information economy can indeed have meaningful effects in the domain of justice and human development.

Despite the caution required in overstating the role that the networked information economy can play in solving issues of justice, it is important to recognize that information, knowledge, and culture are core inputs into human welfare.

> Agricultural knowledge and biological innovation are central to food security.
>
> Medical innovation and access to its fruits are central to living a long and healthy life.
>
> Literacy and education are central to individual growth, to democratic self-governance, and to economic capabilities.
>
> Economic growth itself is critically dependent on innovation and information.
>
> For all these reasons, information policy has become a critical element of development policy and the question of how societies attain and distribute human welfare and well-being.
>
> Access to knowledge has become central to human development.
>
> The emergence of the networked information economy offers definable opportunities for improvement in the normative domain of justice, as it does for freedom, by comparison to what was achievable in the industrial information economy.

We can analyze the implications of the emergence of the networked information economy for justice or equality within two quite different frames.

> The first is liberal, and concerned primarily with some form of equality of opportunity.
>
> The second is social-democratic, or development oriented, and focused on universal provision of a substantial set of elements of human well-being.
>
> The availability of information from nonmarket sources and the range of opportunities to act within a nonproprietary production environment improve distribution in both these frameworks, but in different ways.

Despite the differences, within both frameworks the effect crystallizes into one of access - access to opportunities for one's own action, and access to the outputs and inputs of the information economy.

The industrial economy creates cost barriers and transactional-institutional barriers to both these domains.

The networked information economy reduces both types of barriers, or creates alternative paths around them.

It thereby equalizes, to some extent, both the opportunities to participate as an economic actor and the practical capacity to partake of the fruits of the increasingly information-based global economy.

The opportunities that the network information economy offers, however, often run counter to the central policy drive of both the United States and the European Union in the international trade and intellectual property systems.

These two major powers have systematically pushed for ever-stronger proprietary protection and increasing reliance on strong patents, copyrights, and similar exclusive rights as the core information policy for growth and development.

Chapter 2 explains why such a policy is suspect from a purely economic perspective concerned with optimizing innovation.

A system that relies too heavily on proprietary approaches to information production is not, however, merely inefficient.

It is unjust.

Proprietary rights are designed to elicit signals of people's willingness and ability to pay.

In the presence of extreme distribution differences like those that characterize the global economy, the market is a poor measure of comparative welfare.

A system that signals what innovations are most desirable and rations access to these innovations based on ability, as well as willingness, to pay, overrepresents welfare gains of the wealthy and underrepresents welfare gains of the poor.

Twenty thousand American teenagers can simply afford, and will be willing to pay, much more for acne medication than the more than a million Africans who die of malaria every year can afford to pay for a vaccine.

A system that relies too heavily on proprietary models for managing information production and exchange is unjust because it is geared toward serving small welfare increases for people who can pay a lot for incremental improvements in welfare, and against providing large welfare increases for people who cannot pay for what they need.

Liberal Theories of Justice and the Networked Information Economy

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The networked information economy improves justice from the perspective of every single one of these theories of justice.

Imagine a good that improves the welfare of its users - it could be software, or an

encyclopedia, or a product review.

Now imagine a policy choice that could make production of that good on a nonmarket, peer-production basis too expensive to perform, or make it easy for an owner of an input to exclude competitors - both market-based and social-production based.

For example, a government might decide to:

> recognize patents on software interfaces, so that it would be very expensive to buy the right to make your software work with someone else's;
>
> impose threshold formal education requirements on the authors of any encyclopedia available for school-age children to read, or impose very strict copyright requirements on using information contained in other sources (as opposed to only prohibiting copying their language) and impose high penalties for small omissions;
>
> or give the putative subjects of reviews very strong rights to charge for the privilege of reviewing a product - such as by expanding trademark rights to refer to the product, or prohibiting a reviewer to take apart a product without permission.

The details do not matter.

I offer them only to provide a sense of the commonplace kinds of choices that governments could make that would, as a practical matter, differentially burden nonmarket producers, whether nonprofit organizations or informal peer-production collaborations.

Let us call a rule set that is looser from the perspective of access to existing information resources Rule Set A, and a rule set that imposes higher costs on access to information inputs Rule Set B.

As explained in chapter 2, it is quite likely that adopting B would depress information production and innovation, even if it were intended to increase the production of information by, for example, strengthening copyright or patent.

This is because the added incentives for some producers who produce with the aim of capturing the rents created by copyright or patents must be weighed against their costs.

These include (a) the higher costs even for those producers and (b) the higher costs for all producers who do not rely on exclusive rights at all, but instead use either a nonproprietary market model-like service - or a nonmarket model, like nonprofits and individual authors, and that do not benefit in any way from the increased appropriation.

However, let us make here a much weaker assumption - that an increase in the rules of exclusion will not affect overall production.

Let us assume that there will be exactly enough increased production by producers who rely on a proprietary model to offset the losses of production in the nonproprietary sectors.

It is easy to see why a policy shift from A to B would be regressive from the perspective of theories like Rawls's or Ackerman's.

Under Rule A, let us say that in this state of affairs, State A, there are five online encyclopedias.

One of them is peer produced and freely available for anyone to use.

Rule B is passed.

In the new State B, there are still five encyclopedias.

It has become too expensive to maintain the free encyclopedia, however, and more profitable

to run commercial online encyclopedias.

A new commercial encyclopedia has entered the market in competition with the four commercial encyclopedias that existed in State A, and the free encyclopedia folded.

From the perspective of the difference principle, we can assume that the change has resulted in a stable overall welfare in the Kaldor-Hicks sense.

(That is, overall welfare has increased enough so that, even though some people may be worse off, those who have been made better off are sufficiently better off that they could, in principle, compensate everyone who is worse off enough to make everyone either better off or no worse off than they were before.)

There are still five encyclopedias.

However, now they all charge a subscription fee.

The poorest members of society are worse off, even if we posit that total social welfare has remained unchanged.

In State A, they had access for free to an encyclopedia.

They could use the information (or the software utility, if the example were software) without having to give up any other sources of welfare.

In State B, they must choose between the same amount of encyclopedia usage as they had before, and less of some other source of welfare, or the same welfare from other sources, and no encyclopedia.

If we assume, contrary to theory and empirical evidence from the innovation economics literature, that the move to State B systematically and predictably improves the incentives and investments of the commercial producers, that would still by itself not justify the policy shift from the perspective of the difference principle.

One would have to sustain a much stricter claim: that the marginal improvement in the quality of the encyclopedias, and a decline in price from the added market competition that was not felt by the commercial producers when they were competing with the free, peer-produced version, would still make the poorest better off, even though they now must pay for any level of encyclopedia access, than they were when they had four commercial competitors with their prior levels of investment operating in a competitive landscape of four commercial and one free encyclopedia.

From the perspective of Ackerman's theory of justice, the advantages of the networked information economy are clearer yet.

Ackerman characterizes some of the basic prerequisites for participating in a market economy as access to a transactional framework, to basic information, and to an adequate educational endowment.

To the extent that any of the basic utilities required to participate in an information economy at all are available without sensitivity to price - that is, free to anyone - they are made available in a form that is substantially insulated from the happenstance of initial wealth endowments.

In this sense at least, the development of a networked information economy overcomes some of the structural components of continued poverty - lack of access to information about market opportunities for production and cheaper consumption, about the quality of goods, or lack of communications capacity to people or places where one can act productively.

While Dworkin's theory does not provide a similarly clear locus for mapping the effect of the networked information economy on justice, there is some advantage, and no loss, from this perspective, in having more of the information economy function on a nonmarket basis.

As long as one recognizes bad luck as a partial reason for poverty, then having information resources available for free use is one mechanism of moderating the effects of bad luck in endowment, and lowers the need to compensate for those effects insofar as they translate to lack of access to information resources.

This added access results from voluntary communication by the producers and a respect for their willingness to communicate what they produced freely.

While the benefits flow to individuals irrespective of whether their present state is due to luck or irresponsibility, it does not involve a forced redistribution from responsible individuals to irresponsible individuals.

From the perspective of liberal theories of justice, then, the emergence of the networked information economy is an unqualified improvement.

Commons-Based Strategies for Human Welfare and Development

There is a long social-democratic tradition of focusing not on theoretical conditions of equality in a liberal society, but on the actual well-being of human beings in a society.

This conception of justice shares with liberal theories the acceptance of market economy as a fundamental component of free societies.

However, its emphasis is not equality of opportunity or even some level of social insurance that still allows the slothful to fall, but on assuring a basic degree of well-being to everyone in society.

Particularly in the European social democracies, the ambition has been to make that basic level quite high, but the basic framework of even American Social Security - unless it is fundamentally changed in the coming years - has this characteristic.

The literature on global poverty and its alleviation was initially independent of this concern, but as global communications and awareness increased, and as the conditions of life in most advanced market economies for most people improved, the lines between the concerns with domestic conditions and global poverty blurred.

We have seen an increasing merging of the concerns into a concern for basic human well-being everywhere.

It is represented in no individual's work more clearly than in that of Amartya Sen, who has focused on the centrality of development everywhere to the definition not only of justice, but of freedom as well.

The emerging salience of global development as the core concern of distributive justice is largely based on the sheer magnitude of the problems faced by much of the world's population./2

In the world's largest democracy, 80 percent of the population - slightly more people than the entire population of the United States and the expanded European Union combined - lives on less than two dollars a day, 39 percent of adults are illiterate, and 47 percent of children under the age of five are underweight for their age.

In Africa's wealthiest democracy, a child at birth has a 45 percent probability of dying before he or she reaches the age of forty.

India and South Africa are far from being the worst-off countries.

The scope of destitution around the globe exerts a moral pull on any acceptable discussion of justice.

Intuitively, these problems seem too fundamental to be seriously affected by the networked information economy - what has *Wikipedia* got to do with the 49 percent of the population of Congo that lacks sustainable access to improved water sources?

It is, indeed, important not to be overexuberant about the importance of information and communications policy in the context of global human development.

But it is also important not to ignore the centrality of information to most of our more-advanced strategies for producing core components of welfare and development.

To see this, we can begin by looking at the components of the Human Development Index (HDI).

The Human Development Report was initiated in 1990 as an effort to measure a broad set of components of what makes a life livable, and, ultimately, attractive.

It was developed in contradistinction to indicators centered on economic output, like gross domestic product (GDP) or economic growth alone, in order to provide a more refined sense of what aspects of a nation's economy and society make it more or less livable.

It allows a more nuanced approach toward improving the conditions of life everywhere.

As Sen pointed out, the people of China, Kerala in India, and Sri Lanka lead much longer and healthier lives than other countries, like Brazil or South Africa, which have a higher per capita income./3

The Human Development Report measures a wide range of outcomes and characteristics of life.

The major composite index it tracks is the Human Development Index.

The HDI tries to capture the capacity of people to live long and healthy lives, to be knowledgeable, and to have material resources sufficient to provide a decent standard of living.

It does so by combining three major components: life expectancy at birth, adult literacy and school enrollment, and GDP per capita.

As Figure 9.1 illustrates, in the global information economy, each and every one of these measures is significantly, though not solely, a function of access to information, knowledge, and information-embedded goods and services.

Life expectancy is affected by adequate nutrition and access to life-saving medicines.

Biotechnological innovation for agriculture, along with agronomic innovation in cultivation techniques and other, lower-tech modes of innovation, account for a high portion of improvements in the capacity of societies to feed themselves and in the availability of nutritious foods.

Medicines depend on pharmaceutical research and access to its products, and health care depends on research and publication for the development and dissemination of information about best-care practices.

Education is also heavily dependent, not surprisingly, on access to materials and facilities for teaching.

This includes access to basic textbooks, libraries, computation and communications systems, and the presence of local academic centers.

Finally, economic growth has been understood for more than half a century to be centrally driven by innovation.

This is particularly true of latecomers, who can improve their own condition most rapidly by adopting best practices and advanced technology developed elsewhere, and then adapting to local conditions and adding their own from the new technological platform achieved in this way.

All three of these components are, then, substantially affected by access to, and use of, information and knowledge.

The basic premise of the claim that the emergence of the networked information economy can provide significant benefits to human development is that the manner in which we produce new information - and equally important, the institutional framework we use to manage the stock of existing information and knowledge around the world - can have significant impact on human development.

Information-Embedded Goods and Tools, Information, and Knowledge

One can usefully idealize three types of information-based advantages that developed economies have, and that would need to be available to developing and less-developed economies if one's goal were the improvement in conditions in those economies and the opportunities for innovation in them.

These include information-embedded material resources - consumption goods and production tools - information, and knowledge.

Information-Embedded Goods.

These are goods that are not themselves information, but that are better, more plentiful, or cheaper because of some technological advance embedded in them or associated with their production.

Pharmaceuticals and agricultural goods are the most obvious examples in the areas of health and food security, respectively.

While there are other constraints on access to innovative products in these areas - regulatory and political in nature - a perennial barrier is cost.

And a perennial barrier to competition that could reduce the cost is the presence of exclusive rights, mostly in the form of patents, but also in the form of internationally recognized breeders' rights and regulatory data exclusivity.

In the areas of computation and communication, hardware and software are the primary domains of concern.

With hardware, there have been some efforts toward developing cheaper equipment - like the simputer and the Jhai computer efforts to develop inexpensive computers.

Because of the relatively commoditized state of most components of these systems, however, marginal cost, rather than exclusive rights, has been the primary barrier to access.

The solution, if one has emerged, has been aggregation of demand - a networked

computer for a village, rather than an individual.

For software, the initial solution was piracy.

More recently, we have seen an increased use of free software instead.

The former cannot genuinely be described as a "solution," and is being eliminated gradually by trade policy efforts.

The latter - adoption of free software to obtain state-of-the-art software - forms the primary template for the class of commons-based solutions to development that I explore in this chapter.

Information-Embedded Tools.

One level deeper than the actual useful material things one would need to enhance welfare are tools necessary for innovation itself.

In the areas of agricultural biotechnology and medicines, these include enabling technologies for advanced research, as well as access to materials and existing compounds for experimentation.

Access to these is perhaps the most widely understood to present problems in the patent system of the developed world, as much as it is for the developing world - an awareness that has mostly crystallized under Michael Heller's felicitous phrase "anti-commons," or Carl Shapiro's "patent thicket."

The intuition, whose analytic basis is explained in chapter 2, is that innovation is encumbered more than it is encouraged when basic tools for innovation are proprietary, where the property system gives owners of these tools proprietary rights to control innovation that relies on their tools, and where any given new innovation requires the consent of, and payment to, many such owners.

This problem is not unique to the developing world.

Nonetheless, because of the relatively small dollar value of the market for medicines that treat diseases that affect only poorer countries or of crop varieties optimized for those countries, the cost hurdle weighs more heavily on the public or nonprofit efforts to achieve food security and health in poor and middle-income countries.

These nonmarket-based research efforts into diseases and crops of concern purely to these areas are not constructed to appropriate gains from exclusive rights to research tools, but only bear their costs on downstream innovation.

Information.

The distinction between information and knowledge is a tricky one.

I use "information" here colloquially, to refer to raw data, scientific reports of the output of scientific discovery, news, and factual reports.

I use "knowledge" to refer to the set of cultural practices and capacities necessary for processing the information into either new statements in the information exchange, or more important in our context, for practical use of the information in appropriate ways to produce more desirable actions or outcomes from action.

Three types of information that are clearly important for purposes of development are scientific publications, scientific and economic data, and news and factual reports.

Scientific publication has seen a tremendous cost escalation, widely perceived to

have reached crisis proportions even by the terms of the best-endowed university libraries in the wealthiest countries.

Over the course of the 1990s, some estimates saw a 260 percent increase in the prices of scientific publications, and libraries were reported choosing between journal subscription and monograph purchases./4

In response to this crisis, and in reliance on what were perceived to be the publication cost-reduction opportunities for Internet publication, some scientists - led by Nobel laureate and then head of the National Institutes of Health Harold Varmus - began to agitate for a scientist-based publication system./5

The debates were, and continue to be, heated in this area.

However, currently we are beginning to see the emergence of scientist-run and -driven publication systems that distribute their papers for free online, either within a traditional peer-review system like the Public Library of Science (PLoS), or within tightly knit disciplines like theoretical physics, with only post-publication peer review and revision, as in the case of the Los Alamos Archive, or ArXiv.org.

Together with free software and peer production on the Internet, the PLoS and ArXiv.org models offer insights into the basic shape of the class of commons-based, nonproprietary production solutions to problems of information production and exchange unhampered by intellectual property.

Scientific and economic data present a parallel conceptual problem, but in a different legal setting.

In the case of both types of data, much of it is produced by government agencies.

In the United States, however, raw data is in the public domain, and while initial access may require payment of the cost of distribution, reworking of the data as a tool in information production and innovation - and its redistribution by those who acquired access initially - is considered to be in the public domain.

In Europe, this has not been the case since the 1996 Database Directive, which created a property-like right in raw data in an effort to improve the standing of European database producers.

Efforts to pass similar legislation in the United States have been mounted and stalled in practically every Congress since the mid-1990s.

These laws continue to be introduced, driven by the lobby of the largest owners of nongovernment databases, and irrespective of the fact that for almost a decade, Europe's database industry has grown only slowly in the presence of a right, while the U.S. database industry has flourished without an exclusive rights regime.

News, market reports, and other factual reporting seem to have escaped the problems of barriers to access.

Here it is most likely that the value-appropriation model simply does not depend on exclusive rights.

Market data is generated as a by-product of the market function itself.

Tiny time delays are sufficient to generate a paying subscriber base, while leaving the price trends necessary for, say, farmers to decide at what prices to sell their grain in the local market, freely available./6

As I suggested in chapter 2, the advertising-supported press has never been copyright dependent, but has instead depended on timely updating of news to capture attention, and then attach that attention to advertising.

This has not changed, but the speed of the update cycle has increased and, more important, distribution has become global, so that obtaining most information is now trivial to anyone with access to an Internet connection.

While this continues to raise issues with deployment of communications hardware and the knowledge of how to use it, these issues can be, and are being, approached through aggregation of demand in either public or private forms.

These types of information do not themselves appear to exhibit significant barriers to access once network connectivity is provided.

Knowledge.

In this context, I refer mostly to two types of concern.

The first is the possibility of the transfer of implicit knowledge, which resists codification into what would here be treated as "information" - for example, training manuals.

The primary mechanism for transfer of knowledge of this type is learning by doing, and knowledge transfer of this form cannot happen except through opportunities for local practice of the knowledge.

The second type of knowledge transfer of concern here is formal instruction in an education context (as compared with dissemination of codified outputs for self-teaching).

Here, there is a genuine limit on the capacity of the networked information economy to improve access to knowledge.

Individual, face-to-face instruction does not scale across participants, time, and distance.

However, some components of education, at all levels, are nonetheless susceptible to improvement with the increase in nonmarket and radically decentralized production processes.

The MIT Open Courseware initiative is instructive as to how the universities of advanced economies can attempt to make at least their teaching materials and manuals freely available to teachers throughout the world, thereby leaving the pedagogy in local hands but providing more of the basic inputs into the teaching process on a global scale.

More important perhaps is the possibility that teachers and educators can collaborate, both locally and globally, on an open platform model like *Wikipedia*, to coauthor learning objects, teaching modules, and, more ambitiously, textbooks that could then be widely accessed by local teachers

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Toward Adopting Commons-Based Strategies for Development

The mainstream understanding of intellectual property by its dominant policy-making institutions - the Patent Office and U.S. trade representative in the United States, the Commission in the European Union, and the World Intellectual Property Organization (WIPO) and Trade-Related Aspects of Intellectual Property (TRIPS) systems internationally - is that strong protection is good, and stronger protection is better.

> In development and trade policy, this translates into a belief that the primary mechanism for knowledge transfer and development in a global information economy is for all nations, developing as well as developed, to ratchet up their intellectual property law standards to fit the most protective regimes adopted in the United States and Europe.
>
> As a practical political matter, the congruence between the United States and the European Union in this area means that this basic understanding is expressed in the international trade system, in the World Trade Organization (WTO) and its TRIPS agreement, and in international intellectual property treaties, through the WIPO.
>
> The next few segments present an alternative view.
>
> Intellectual property as an institution is substantially more ambiguous in its effects on information production than the steady drive toward expansive rights would suggest.
>
> The full argument is in chapter 2.

Intellectual property is particularly harmful to net information importers.

> In our present world trade system, these are the poor and middle-income nations.
>
> Like all users of information protected by exclusive rights, these nations are required by strong intellectual property rights to pay more than the marginal cost of the information at the time that they buy it.
>
> In the standard argument, this is intended to give producers incentives to create information that users want.
>
> Given the relative poverty of these countries, however, practically none of the intellectual-property-dependent producers develop products specifically with returns from poor or even middle-income markets in mind.
>
> The pharmaceutical industry receives about 5 percent of its global revenues from low- and middle-income countries.
>
> That is why we have so little investment in drugs for diseases that affect only those parts of the world.
>
> It is why most agricultural research that has focused on agriculture in poorer areas of the world has been public sector and nonprofit.
>
> Under these conditions, the above-marginal-cost prices paid in these poorer countries are purely regressive redistribution.
>
> The information, knowledge, and information-embedded goods paid for would have been developed in expectation of rich world rents alone.
>
> The prospects of rents from poorer countries do not affect their development.
>
> They do not affect either the rate or the direction of research and development.
>
> They simply place some of the rents that pay for technology development in the rich countries on consumers in poor and middle-income countries.

The morality of this redistribution from the world's poor to the world's rich has never been confronted or defended in the European or American public spheres.

It simply goes unnoticed.

When crises in access to information-embedded goods do appear - such as in the AIDS/HIV access to medicines crisis - these are seldom tied to our basic institutional choice.

In our trade policies, Americans and Europeans push for ever-stronger protection.

We thereby systematically benefit those who own much of the stock of usable human knowledge.

We do so at the direct expense of those who need access to knowledge in order to feed themselves and heal their sick.

The practical politics of the international intellectual property and trade regime make it very difficult to reverse the trend toward ever-increasing exclusive property protections.

The economic returns to exclusive proprietary rights in information are highly concentrated in the hands of those who own such rights.

The costs are widely diffuse in the populations of both the developing and developed world.

The basic inefficiency of excessive property protection is difficult to understand by comparison to the intuitive, but mistaken, Economics 101 belief that property is good, more property is better, and intellectual property must be the same.

The result is that pressures on the governments that represent exporters of intellectual property rights permissions - in particular, the United States and the European Union - come in this area mostly from the owners, and they continuously push for ever-stronger rights.

Monopoly is a good thing to have if you can get it.

Its value for rent extraction is no less valuable for a database or patent-based company than it is for the dictator's nephew in a banana republic.

However, its value to these supplicants does not make it any more efficient or desirable.

The political landscape is, however, gradually beginning to change.

Since the turn of the twenty-first century, and particularly in the wake of the urgency with which the HIV/AIDS crisis in Africa has infused the debate over access to medicines, there has been a growing public interest advocacy movement focused on the intellectual property trade regime.

This movement is, however, confronted with a highly playable system.

A victory for developing world access in one round in the TRIPS context always leaves other places to construct mechanisms for exclusivity.

Bilateral trade negotiations are one domain that is beginning to play an important role.

In these, the United States or the European Union can force a rice- or cotton-exporting country to concede a commitment to strong intellectual property protection in exchange for favorable treatment for their core export.

The intellectual property exporting nations can then go to WIPO, and push for new treaties based on the emerging international practice of bilateral agreements.

This, in turn, would cycle back and be generalized and enforced through the trade regimes.

Another approach is for the exporting nations to change their own laws, and then drive

higher standards elsewhere in the name of "harmonization."

Because the international trade and intellectual property system is highly "playable" and manipulable in these ways, systematic resistance to the expansion of intellectual property laws is difficult.

The promise of the commons-based strategies explored in the remainder of this chapter is that they can be implemented without changes in law - either national or international.

They are paths that the emerging networked information economy has opened to individuals, nonprofits, and public-sector organizations that want to help in improving human development in the poorer regions of the world to take action on their own.

As with decentralized speech for democratic discourse, and collaborative production by individuals of the information environment they occupy as autonomous agents, here too we begin to see that self-help and cooperative action outside the proprietary system offer an opportunity for those who wish to pursue it.

In this case, it is an opportunity to achieve a more just distribution of the world's resources and a set of meaningful improvements in human development.

Some of these solutions are "commons-based," in the sense that they rely on free access to existing information that is in the commons, and they facilitate further use and development of that information and those information-embedded goods and tools by releasing their information outputs openly, and managing them as a commons, rather than as property.

Some of the solutions are specifically peer-production solutions.

We see this most clearly in software, and to some extent in the more radical proposals for scientific publication.

I will also explore here the viability of peer-production efforts in agricultural and biomedical innovation, although in those fields, commons-based approaches grafted onto traditional public-sector and nonprofit organizations at present hold the more clearly articulated alternatives.

Software

The software industry offers a baseline case because of the proven large scope for peer production in free software.

As in other information-intensive industries, government funding and research have played an enormously important role, and university research provides much of the basic science.

However, the relative role of individuals, nonprofits, and nonproprietary market producers is larger in software than in the other sectors.

First, two-thirds of revenues derived from software in the United States are from services and do not depend on proprietary exclusion.

Like IBM's "Linux-related services" category, for which the company claimed more than two billion dollars of revenue for 2003, these services do not depend on exclusion from the software, but on charging for service relationships./7

Second, some of the most basic elements of the software environment - like standards and protocols - are developed in nonprofit associations, like the Internet Engineering Taskforce or the World Wide Web Consortium.

Third, the role of individuals engaged in peer production - the free and open-source software development communities - is very large.

Together, these make for an organizational ecology highly conducive to nonproprietary production, whose outputs can be freely usable around the globe.

The other sectors have some degree of similar components, and commons-based strategies for development can focus on filling in the missing components and on leveraging nonproprietary components already in place.

In the context of development, free software has the potential to play two distinct and significant roles.

The first is offering low-cost access to high-performing software for developing nations.

The second is creating the potential for participation in software markets based on human ability, even without access to a stock of exclusive rights in existing software.

At present, there is a movement in both developing and the most advanced economies to increase reliance on free software.

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Commons-Based Strategies for Development: Conclusion

Welfare, development, and growth outside of the core economies heavily depend on the transfer of information-embedded goods and tools, information, and knowledge from the technologically advanced economies to the developing and less-developed economies and societies around the globe.

These are important partly as finished usable components of welfare.

Perhaps more important, however, they are necessary as tools and platforms on which innovation, research, and development can be pursued by local actors in the developing world itself - from the free software developers of Brazil to the agricultural scientists and farmers of Southeast Asia.

The primary obstacles to diffusion of these desiderata in the required direction are the institutional framework of intellectual property and trade and the political power of the patent-dependent business models in the information-exporting economies.

This is not because the proprietors of information goods and tools are evil.

It is because their fiduciary duty is to maximize shareholder value, and the less-developed and developing economies have little money.

As rational maximizers with a legal monopoly, the patent holders restrict output and sell at higher rates.

This is not a bug in the institutional system we call "intellectual property."

It is a known feature that has known undesirable side effects of inefficiently restricting access to the products of innovation.

In the context of vast disparities in wealth across the globe, however, this known feature does not merely lead to less than theoretically optimal use of the information.

It leads to predictable increase of morbidity and mortality and to higher barriers to development.

The rise of the networked information economy provides a new framework for thinking about how to work around the barriers that the international intellectual property regime places on

development.

Public-sector and other nonprofit institutions that have traditionally played an important role in development can do so with a greater degree of efficacy.

Moreover, the emergence of peer production provides a model for new solutions to some of the problems of access to information and knowledge.

In software and communications, these are directly available.

In scientific information and some educational materials, we are beginning to see adaptations of these models to support core elements of development and learning.

In food security and health, the translation process may be more difficult.

In agriculture, we are seeing more immediate progress in the development of a woven fabric of public-sector, academic, nonprofit, and individual innovation and learning to pursue biological innovation outside of the markets based on patents and breeders' rights.

In medicine, we are still at a very early stage of organizational experiments and institutional proposals.

The barriers to implementation are significant.

However, there is growing awareness of the human cost of relying solely on the patent-based production system, and of the potential of commons-based strategies to alleviate these failures.

Ideally, perhaps, the most direct way to arrive at a better system for harnessing innovation to development would pass through a new international politics of development, which would result in a better-designed international system of trade and innovation policy.

There is in fact a global movement of NGOs and developing nations pursuing this goal.

It is possible, however, that the politics of international trade are sufficiently bent to the purposes of incumbent industrial information economy proprietors and the governments that support them as a matter of industrial policy that the political path of formal institutional reform will fail.

Certainly, the history of the TRIPS agreement and, more recently, efforts to pass new expansive treaties through the WIPO suggest this.

However, one of the lessons we learn as we look at the networked information economy is that the work of governments through international treaties is not the final word on innovation and its diffusion across boundaries of wealth.

The emergence of social sharing as a substantial mode of production in the networked environment offers an alternative route for individuals and nonprofit entities to take a much more substantial role in delivering actual desired outcomes independent of the formal system.

Commons-based and peer production efforts may not be a cure-all.

However, as we have seen in the software world, these strategies can make a big contribution to quite fundamental aspects of human welfare and development.

And this is where freedom and justice coincide.

The practical freedom of individuals to act and associate freely - free from the constraints of proprietary endowment, free from the constraints of formal relations of contract or stable organizations - allows individual action in ad hoc, informal association to emerge as a new global

mover.

It frees the ability of people to act in response to all their motivations.

In doing so, it offers a new path, alongside those of the market and formal governmental investment in public welfare, for achieving definable and significant improvements in human development throughout the world.