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Commons-based Peer Production and Virtue*

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COMMONS-BASED peer production is a socio-economic system of production that is emerging in the digitally networked environment. Facilitated by the technical infrastructure of the Internet, the hallmark of this socio-technical system is collaboration among large groups of individuals, sometimes in the order of tens or even hundreds of thousands, who cooperate effectively to provide information, knowledge or cultural goods without relying on either market pricing or managerial hierarchies to coordinate their common enterprise.[1] While there are many practical reasons to try to understand a novel system of production that has produced some of the finest software, the fastest supercomputer and some of the best web-based directories and news sites, here we focus on the ethical, rather than the functional dimension. What does it mean in ethical terms that many individuals can find themselves cooperating productively with strangers and acquaintances on a scope never before seen? How might it affect, or at least enable, human action and affection, and how would these effects or possibilities affect our capacities to be virtuous human beings? We suggest that the emergence of peer production offers an opportunity for more people to engage in practices that permit them to exhibit and experience virtuous behavior. We posit: (a) that a society that provides opportunities for virtuous behavior is one that is more conducive to virtuous individuals; and (b) that the practice of effective virtuous behavior may lead to more people adopting virtues as their own, or as attributes of what they see as their self-definition. The central thesis of this paper is that socio-technical systems of commons-based peer production offer not only a remarkable medium of production for various

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[1]Yochai Benkler, "Coase's penguin, or Linux and the nature of the firm," *Yale Law Journal*, 112 (2002), 369–446; Benkler, "Sharing nicely: on sharable goods and the emergence of sharing as a modality of economic production," *Yale Law Journal*, 114 (2004), 273–358.

kinds of information goods but serve as a context for positive character formation. Exploring and substantiating these claims will be our quest, but we begin with a brief tour through this strange and exciting new landscape of commons-based peer production and conclude with recommendations for public policy.

I. COMMONS-BASED PEER PRODUCTION – EXAMPLES

The best-known examples of commons-based peer production are the tens of thousands of successful free software projects that have come to occupy the software development market. Free or open source software development is an approach to developing software that resembles nothing so much as an idealized barn raising—a collective effort of individuals contributing towards a common goal in a more-or-less informal and loosely structured way. No single entity "owns" the product or manages its direction. Instead, it emerges from the collaboration of groups of developers, ranging from a few individuals up to many thousands. Many of the participants are volunteers working in their spare time. Some are paid by corporations that do not themselves claim ownership in the product, but benefit from its development by selling services or equipment associated with the software. The flagship products of free or open source software development—the GNU/Linux operating system, the Apache web server, Perl and BIND—are the most famous. But at any given moment there are tens of thousands of free software development projects, and hundreds of thousands of software developers collaborate on them in various forms to produce some of the world's best software.[2] As Moglen pointed out, free software gains its salience from its functionality. One can compare the products of free software development communities with those of corporations, like Microsoft's. There is a technical answer to the question: is this software better or worse?[3] It is this measurable quality that has forced businesses and governments to take notice of free software. It is what caused the President's Technology Advisory Committee in 2000 to recommend U.S. adoption of open source software as a strategy for supplying mission critical software.[4] Measurable contributions to its machines and services caused IBM to invest over a billion dollars to support development of the Linux kernel and Apache Web Server software, without seeking ownership in the product.

While its functional success forces observers to take free software seriously as a sustainable form of production, what makes free software interesting from a

[2]Josh Lerner and Jean Tirole, "Some simple economics of open source," *Journal of Industrial Economics*, 50 (2002), 197–234.

[3]Eben Moglen, "Anarchism triumphant: free software and the death of copyright," *First Monday*, 4 (August 1999); Available at http://www.firstmonday.org/issues/issue4_8_mogden (accessed April 25, 2005).

[4]President's Information Technology Advisory Committee, *Developing Open Source Software to Advance High End Computing* (Washington, D.C.: Government Printing Office, 2000).

social or moral perspective is its social and human structure. No one "owns" a free software project, though individuals own—in a formal sense—the software they contribute. Its touchstone is that all these individual contributors agree that none of them shall exclude anyone else from using it—whether they contributed to the development or not. No one is a formal manager who tells different people what they must do so that the project can succeed. Though leadership is present in many projects, it is based on no formal power to limit discussion, prevent subgroups from branching off if they are unhappy with a leadership decision, and in any event never involves the assignment of projects—no one can require or prohibit action by anyone. The effort is sustained by a combination of volunteerism and good will, technology, some law—mostly licensing like the GNU General Public License that governs most free software development—and a good bit of self-serving participation. But all these factors result in a model of production that avoids traditional price mechanisms or firm managers in organizing production or motivating its participants.

While the measurable efficacy of free software has captured wide attention, free software does not exhaust the universe of instances where one sees this emerging phenomenon of "barn raising"-like production on the Net. As one begins to look at information, knowledge and cultural production on the Internet, it becomes clear that free software is but one, particularly salient, instance of a more general phenomenon, the phenomenon of commons-based peer production. To provide something of a sense of this phenomenon and its human characteristics, we offer a few more examples. The first two capture the potential efficacy of widespread volunteer effort. The latter begin to give texture to the claim that these efforts offer a platform for qualitatively attractive human behavior.

The simplest example of large-scale volunteer production is distributed computing. Take SETI@home for example. The project is a scientific experiment that uses Internet-connected computers in a Search for Extraterrestrial Intelligence (SETI). The data sets collected from large radio telescope observations are immense. The project was organized to harness the computer processing cycles of millions of volunteers with computers connected to the Internet to process these vast data sets. Participants download a small free program that functions as a screen saver when they are not using their computers. At that point, it downloads and analyzes radio telescope data. According to statistics maintained on the SETI@home website, as of August, 2003, the project had absorbed over 4.5 million users from 226 countries, and provided an average computation speed almost twice that of the fastest "supercomputer" then in operation in the world. The approach, called distributed computing, has been similarly harnessed to simulate the process of protein folding (Folding@home), to model the evolution of drug resistance and design anti-HIV drugs (Fightaidsathome), and a host of other scientific and publicly minded projects.

A step up in human participation, but still fairly mechanical, was the NASA Clickworkers experiment. In this project, tens of thousands of individual volunteers collaborated in five-minute increments to map and classify Mars's craters, performing tasks that would normally require full-time PhDs working for months on end, freeing those scientists for more analytic tasks. In the first six months of the project's operation, over 85,000 users visited the site with many contributing to the effort, making over 1.9 million entries (including redundant entries of the same craters, used to average out errors). An analysis of the quality of markings up to that point showed "that the automatically-computed consensus of a large number of Clickworkers is virtually indistinguishable from the inputs of a geologist with years of experience in identifying Mars craters."[5]

Both Clickworkers and distributed computing on the model of SETI@home offer examples that are easy to comprehend and measure, but involve relatively mundane and small-scale contributions. They require relatively little of their participants. To outline the type of behaviors that one sees in these collaborations, we turn to three richer examples of large-scale collaboration, where contributions are larger and require more of the knowledge of the participants and their willingness to participate in a cohesive social process.

The first such project is the Wikipedia project, which involves some 30,000 volunteers who collaborate to write an encyclopedia. While they have not been able to generate a complete encyclopedia in their roughly three years of operation, they have made substantial progress, producing about 250,000 articles in English and many more articles in other languages. Readers are invited to test their own evaluation of the quality, but we would venture that Wikipedia holds its own by comparison to all other online encyclopedias, excluding, perhaps, Britannica. What Wikipedia provides, then, is a rich example of a medium sized collection of individuals, who collaborate to produce an information product of mid-brow quality and who are reasonably successful.

The Wikipedia project runs on a free software collaborative authorship tool, Wiki, which is a markup language similar in concept to HTML but optimized to permit multiple users to edit a single document and interlocking documents while generating archives of the changes made to each. Unlike the projects we will describe in the following few paragraphs, Wikipedia does not include elaborate software-controlled access and editing capabilities. On the contrary, its most interesting characteristic is the self-conscious use of open discourse, usually aimed at consensus, and heavy reliance on social norms and user-run quasi-formal mediation and arbitration, rather than on mechanical control of behavior. It begins with a statement of community intent—to produce an "encyclopedia"—rather than a series of opinion pieces. It continues with a

[5]"Clickworkers results: crater marking activity," July 3, 2001; available at http://clickworkers.arc.nasa.gov (accessed April 25, 2005).

technical architecture that allows anyone to contribute, edit and review the history of any document easily. These two characteristics account for the vast majority of document development. Someone starts a definition. Others update, contributing substance and editorial improvements. Occasionally, disagreements will arise. These are usually dealt with in a "Talk" page associated with every definition. On relatively rare occasions when disagreement persists, there are mechanisms for mediation, and ultimately arbitration, run by participants in the community who are chosen by other users for their sustained commitment to the project. For more decisions, such as determining the policies of Wikipedia, consensus rather than majority vote is the practice. In the cases of vandalism, which occurs on Wikipedia occasionally, the first line of defense is provided by the editors themselves, who have simple means of reverting to an earlier, clean version. The last line of defense is for system operators to block a user.

The important point is that Wikipedia requires much more than mere mechanical cooperation among participants. It requires a commitment to a particular approach to conceiving of one's task, and a style of writing and describing concepts, that are far from intuitive or natural. It requires self-discipline. It enforces the behavior it requires primarily through appeal to the common enterprise in which the participants are engaged, coupled with a thoroughly transparent platform that faithfully records and renders all individual interventions in the common project and facilitates discourse among participants about how their contributions do, or do not, contribute to this common enterprise. This combination of an explicit statement of common purpose, transparency, discourse and the ability of participants to identify each other's actions and counteract them—that is, edit out "bad" or "faithless" definitions—seems to have succeeded in keeping this community from devolving into inefficacy or worse. What is surprising from the perspective of established conceptions of social cooperation is that this success occurs not in a tightly knit community with many social relations to reinforce the sense of common purpose and the social norms embodying it, but in a large and geographically dispersed group of otherwise unrelated participants: there are as we write about 25,000 participants in the English language Wikipedia, and another 30,000 participants contributing to younger Wikipedia projects in many other languages.

Perhaps the most visible collective commentary project on the Internet as of the mid-2000s is Slashdot, a collaboration platform used by between 250,000 and 500,000 users. Users post links to technology stories they come across, together with comments on them. Others then join in a conversation about the technology-related events, with comments on the underlying stories as well as comments on comments. Comments are in turn "moderated" by other readers in small increments, for quality and relevance: To "moderate" in this system means to grade a comment—to mark whether it is relevant or not, high or low quality, etc. Users who are registered, rather than anonymous, and who have posted for a while, are given by the system limited moderation privileges. Each

moderator has a single vote, positive or negative, on any given comment. Out of the collective judgment of the users who chose to moderate a given comment, a collective judgment is computed. The comment is then associated with a certain value, ranging from –1 to 5, indicating its quality and relevance to the topic of conversation, as judged by the moderators in the aggregate. Users can then set their browsers to read only comments above a certain threshold they choose to use, or they can organize their reading of the comments based on the quality judgments of their peers. Out of these mechanisms a newsletter emerges that is widely read as a highly informative source of information about computer software in particular, and information and communications technology more generally.

The relative roles of technology and social norms in Slashdot and Wikipedia are very different. The Slashdot software platform, Slash, is given a very active role in moderating the discussion and the peer review process. Rather than relying on self-discipline and a sense of common purpose, the software builds in limits on use that are designed to constrain anti-social behavior. For example, each user receives only five moderation points in any three day period. This severely limits the amount of influence any one person can have on the collective judgment of a group of hundreds of thousands of users. Users cannot post constantly and automatically—their submissions will be rejected if they try to post comments too often in any minute or hour. But the system also relies on collective judgment and mutual review. Every person who moderates comments is subject to peer review. Users who agree to perform this peer review, or "meta-moderation," receive a series of anonymous moderations produced by other participants. They rank these moderations as fair or unfair. A moderator whose judgments are consistently considered by others to be unfair will no longer be permitted by the system to moderate comments. Because there is no ultimate single document, the conversation facilitated by Slashdot does not require the kinds of dispute resolution mechanisms that Wikipedia has employed. Disagreements persist in the record of the conversations, to be resolved by subsequent readers.

There are many other peer-production projects on the Net. Somewhat similar to Slashdot is Kuro5hin, designed to enable its users to share more substantial writing efforts than the usually brief comments produced for Slashdot. Scoop, the software that runs Kuro5hin, functions in many senses similarly to Slash. The most interesting difference is that in Kuro5hin, there is a substantial degree of pre-publication peer review in a "submissions" area, whereas in Slashdot all the discussion is public. Kuro5hin also involves editorial commentary, rather than simply substantive discussion and an up-or-down moderation. A more distinct, but no less impressive exercise, is the Open Directory Project. That site relies on tens of thousands of volunteer editors to determine which links should be included in a human-edited directory similar to Yahoo. Acceptance as a volunteer requires application. Not all are accepted, and quality relies on a peer

review process based substantially on seniority and engagement as a volunteer. The site is hosted and administered by Netscape, which pays for server space and a small number of employees to administer the site and set up the initial guidelines, but licenses the database freely. The volunteers are not affiliated with Netscape. Out of the joy of doing so, or for other internal or external motivations, they spend time in relatively small increments selecting sites for inclusion in the directory. The result has been perhaps the most comprehensive, highest quality human-edited directory of the Web—competing with, and often outperforming, Yahoo in this category.

II. COMMONS-BASED PEER PRODUCTION – PRINCIPLES

The phenomenon of large- and medium-scale collaborations among individuals, organized without markets or managerial hierarchies, is emerging everywhere in the information and cultural production system. Elsewhere, Benkler has provided a detailed analysis of the economics of this emerging phenomenon;[6] here we briefly recapitulate this analysis, with a particular focus on characteristics that are relevant to the specific arguments of this paper.

At its core, peer production is a model of social production, emerging alongside contract- and market-based, managerial-firm based and state-based production. These forms of production are typified by two core characteristics. The first is decentralization. Authority to act resides with individual agents faced with opportunities for action, rather than in the hands of a central organizer, like the manager of a firm or a bureaucrat. The second is that they use social cues and motivations, rather than prices or commands, to motivate and coordinate the action of participating agents. As a descriptive matter, the phenomenon is a product of the emergence of digital networks and the rising importance of information and cultural production. The wide distribution of low-cost processors, coupled with increasingly ubiquitous computation, changes the capital structure of information production. Physical capital is widely distributed and owned by those individuals who also are capable of contributing the other major input into information and cultural production—human effort and creativity. Because it obviates the need for centralized capital investment, this capital structure makes possible—though does not require—the reorganization of at least some information and cultural production along decentralized lines. In this technical-economic context, peer-production enterprises appear to be emerging as newly feasible social and technical systems that motivate and organize human collective contributions by means other than contracts and monetary compensation for the use of physical capital.

Commons-based peer-production relations regularly exhibit three structural attributes. First, the potential objects of peer production must be modular. That

[6]Benkler, "Coase's penguin."

is, they must be divisible into components, or modules, each of which can be produced independently of the production of the others. This enables production to be incremental and asynchronous, pooling the individual discrete efforts of different people, with different capabilities, who are available at different times. Second, the granularity of the modules is important. Granularity refers to the sizes of the project's modules, and in order for a peer-production process successfully to pool a relatively large pool of contributors the modules should be predominantly fine-grained, or small in size. This allows the project to capture contributions from large numbers of contributors whose motivation level will not sustain anything more than quite small efforts towards the project. Novels, for example, at least those that look like our current conception of a novel, are likely to prove resistant to peer production. But as we have already suggested, encyclopedia entries, judgments about the worth of one or another website and components of software programs are commonly and effectively produced in this fashion. In addition, a project will likely be more efficient if it can accommodate variously sized contributions. Heterogeneous granularity will allow people with different levels of motivation to collaborate by contributing smaller or larger grained contributions, consistent with their level of motivation.

Finally, a successful peer-production enterprise must have low-cost integration—the mechanism by which the modules are integrated into a whole end product. Integration must include both quality controls over the modules and a mechanism for integrating the contributions into the finished product. First, the project must include an established, low-cost way of defending itself against both incompetent and malicious contributions. Given that peer production is dependent on self-identification of people for projects, each community must have a way of weeding out contributions from those who misidentify their talents. Second, the project must include a mechanism for integrating the competent modules into a finished product at sufficiently low cost. As one observes actual peer-production communities, a number of robust methods have emerged. First, one sees automated integration and iterative peer production of integration. For example, the use of free software mechanically to integrate modules of some other information good is a primary mechanism by which particular peer-production projects like Slashdot, Kuro5hin and Wikipedia have lowered the cost of integration to the point where they can succeed and sustain themselves. Second, one sees peer-production enterprises using a variety of approaches towards solving collective action problems that are relatively familiar from the offline commons literature.[7] These include various formal rules, like the GNU GPL (General Public License) that prevents defection from many free software projects, including most prominently the GNU/Linux

[7]Charlotte Hess and Elinor Ostrom, "Artifacts, facilities, and content: information as a common-pool resource," *Journal of Law & Contemporary Problems*, 63 (2003), 111–145. See also Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge, Mass: Cambridge University Press, 1992).

operating system. They also include technical constraints that prevent or limit the effect of defection, as in the case of the limited voting power that Slash or Scoop give each individual editor on Slashdot or Kuro5hin, respectively. Social norms too play a role in sustaining some of these collaborations, both where there are small groups, and where there are larger groups and the platform allows for good monitoring and repair when individuals defect. This approach is particularly salient in the Wikipedia project. Finally, the NASA Clickworkers project suggests that the sheer size of some of these projects enables the collaboration platform to correct for defection by using redundancy of contributions and averaging out the contributions of outliers—be they malicious or incompetent.

When they succeed in motivating and organizing collaborations, peer-production enterprises have two primary advantages from a purely economic perspective over both markets and firm hierarchies. The first is an information gain. Because individuals have widely variable creativity, experience, insight, motivation and availability, human capital tends to be hard to specify for efficient contracting or formal organizational assignment. Firms and markets therefore simplify decision making by losing a lot of information about the tremendous variability of human creativity and motivation over time and context. Peer production, by contrast, allows individuals to self-identify for tasks that attract them and for which they are suited. As long as a peer-production enterprise institutes mechanisms for peer review of some sort to weed out mistakes, peer-production enterprises generate more textured and dynamically updated information about the capabilities and availability of agents for actions. Second, the variability in fit of people to projects and existing information resources is great. This leads to substantial increasing returns to scale to the number of people, resources and projects that may be pursued without need for a contract or other transaction permitting the use of the resource for a project. The larger the number of people who can potentially work on projects, the larger the number of resources with which they can work to pursue projects; and the larger the number of projects they can initiate and imagine, the higher the probability that the best set of persons will be able to work on the set of resources with which they would be most productive, towards the project most suitable from that combination. Peer production, by making information resources freely available to potentially huge collections of individuals, maximizes the effect.

Before turning to an analysis of the relationship between the emergence of peer production and virtue, it is important to underscore one further central characteristic of peer production. By definition, peer-production enterprises are non-price based, that is, they are devoid of marginal payments to contributors for contributions. While some contributors contribute because of an expectation of learning and earning a reputation that could translate into a job in the future, most of the participation cannot easily be explained by a relatively mechanistic reliance on economic incentives. Rather, it seems that peer-production enterprises

thrive on, and give opportunity for, relatively large scale and effective scope for volunteerism, or behavior motivated by, and oriented towards, positive social relations. People contribute for a variety of reasons, ranging from the pure pleasure of creation, to a particular sense of purpose, through to the companionship and social relations that grow around a common enterprise. What makes peer-production enterprises work best has been the capacity to harness many people, with many and diverse motivations, towards common goals in concerted effort. While understudied and difficult to predict and manage by comparison to a more simple picture of human motivation as driven by personal wealth maximization, peer production begins to offer a rich texture in which to study the much more varied and multifarious nature of human motivation and effective human action.

The economic potential of the phenomenon of commons-based peer production may or may not be sufficient reason to support its growth and justify attention to factors or conditions needed for its flourishing. It certainly suggests the potential staying power and sustainability of this mode of production in an economy and society heavily attentive to economic performance. Here, however, we are interested in considerations beyond economic efficiency. Taking a moral perspective, we argue that the remarkable social and technical phenomenon of commons-based peer production fosters virtue by creating a context or setting that is conducive to virtuous engagement and practice, thereby offering a medium for inducing virtue itself in its participants.

III. COMMONS-BASED PEER PRODUCTION AND VIRTUE

Before we are able to develop our claim about virtue and commons-based peer production, we need to say something about the notion of virtue that we will be using. Those of us educated in a Western, analytic school of philosophy tend to think of virtue as essentially an Aristotelian creation, passed down and elaborated along the way by just about every historically significant moral philosopher, including Kant, Nietzsche and Hume, falling into disfavor in the mainstream until roughly two decades ago and benefiting from a revival of interest through persuasive interventions of contemporary moral philosophers such as Phillipa Foot, Alasdair MacIntyre, Martha Nussbaum, Bernard Williams, Michael Slote, Rosalind Hursthouse and others. Yet the idea of virtue is far richer than even that pedigree would suggest, spanning centuries as well as cultures and religions. Robust notions of virtue have been recorded in commentaries on ancient Confucian philosophers, such as those by Xunzi, born circa 310 B.C.E. Not only has it been theorized by countless philosophers and theologians throughout ages and across continents, but it has a robust meaning in natural languages, regularly uttered in everyday speech.

We have tried not to tie our discussion to a specific theory or doctrine of the virtues and virtue ethics. By staying as close as possible to an intuitively plausible

sense of virtue, remaining neutral on many of the most controversial theoretical questions, and plumbing only the most robust insights of scholarship where they are relevant to our arena of application, we have aimed for as broadly appealing a conceptual foundation as possible. This neutrality applies to three broad areas: We make no commitment to the specific number or particular catalog of the virtues but assume the existence and character of those that have enjoyed broad recognition. We are agnostic on the foundations of virtue, whether in ideals of human flourishing and the good life (Aristotle, MacIntyre), naturalism (Foot and Hursthouse) or utilitarianism (Hume, Driver).

Finally, we take no position on the meta-ethical question of whether virtue ethics is best understood as a rival to deontological and Utilitarian accounts of "the problems and phenomena of ethics."[8] As a working position, we prefer David Wiggins' ecumenical line:

> What a grown-up moral philosophy might attempt is an account of morality that embraces the full gamut of moral predications, seeing them as mutually irreducible and mutually indispensable, allowing no primacy to character traits or practices or states of affairs—or allowing primacy to all at once.[9]

Ideally, this stance will allow the primary focus of our discussion, and inevitable controversy, to settle on concrete claims rather than these much debated elements of the conceptual landscape.

At a minimum, however, we take virtue ethics to be an important approach to moral evaluation, which offers a framework for appraising people over time, in contrast with other dominant approaches that appraise actions, atomistically, in terms of consequences or compatibility with deontological rules. In other words, where the basic unit of moral evaluation for rival frameworks is individual actions (or action-types), the basic unit of moral evaluation for virtue ethics is the person (or soul or character), an entity persisting over time. Accordingly, Rosalind Hursthouse writes, "If you have the virtues of, say, generosity, honesty, and justice, generous, honest, and just is the sort of person you are."[10] Most contemporary virtue theorists and virtue ethicists consider the character to be the bearer of virtue, "an admirable character trait;"[11] that is, "those qualities of character the possession and exercise of which make human

[8]Michael Slote, *From Morality to Virtue* (New York: Oxford University Press, 1987). For further information on "human flourishing and the good life," see Aristotle, "Nichomachean ethics," *Moral Philosophy: Selected Readings*, ed. George Sher (San Diego: Harcourt Brace Jovanovich, 1987) and Alasdair McIntyre, *After Virtue* (Notre Dame, Ind.: University of Notre Dame Press, 1984). On "naturalism," see Philippa Foot, *Virtues and Vices and Other Essays in Moral Philosophy* (Berkeley: University of California Press, 1978) and Rosalind Hursthouse, *On Virtue Ethics* (Oxford: Oxford University Press, 1999). On "utilitarianism," see Julia Driver, *Uneasy Virtue* (Cambridge: Cambridge University Press, 2001) and David Hume, *Enquiry Concerning the Principles of Morals*, ed. P.H. Niddich, 3rd edn (Oxford: Clarendon Press, 1975; originally published 1751).

[9]David Wiggins, "Natural and artificial virtues: a vindication of Hume's scheme," *How One Should Live: Essays on Virtue*, ed. Roger Crisp (Oxford: Clarendon Press, 1996), pp. 131–40.

[10]Hursthouse, *On Virtue Ethics*, p. 11.

[11]Slote, *From Morality to Virtue*, p. 10.

beings flourish."[12] Finally, most virtue theories allow that character, the bearer of virtues, is not immutable and its virtue may ebb and flow.

By most accounts, virtues are dispositional properties, though particularly with many of the most important virtues such as, honesty, justice, courage and benevolence they are not simple dispositions to act in narrowly specified ways. Being honest, for example, does not merely involve telling the truth, or never telling a lie, but a complex pattern of beliefs, desires, emotions, preferences, sensitivities, opinions and broadly related actions and practices, even as general as how one rears one's children. Equally clear is that particular instances of beliefs, actions, emotions and so forth need not imply the virtue of honesty, as, for example, the conman who happens to tell the truth in a court of law. This point, thoroughly discussed in contemporary writings such as those of Hursthouse and others, is also recognized in ancient works, such as in those of Xunzi, who holds that virtues are dispositions involving the faculties of choice, judgments, desire, emotion and action. Further, virtues can be manifested in a great variety of ways, depending on circumstances.[13]

Later in the paper, we will refer to other general features of virtues but, first, it will be useful to plunge directly into an analysis of systematic associations between particular virtues and characteristics inherent to commons-based peer production. To avoid quibbling over differences that may have more to do with contingencies of language than with substance, it makes sense to put forward these associations in terms of clusters of virtues associated with socio-technical systems of commons-based peer production rather than individually named virtues.

A. Cluster I: Autonomy, Independence, Liberation

As noted above, an essential feature of commons-based peer production is volunteerism and self-selection. In the first place, individuals have chosen freely to participate and are free to continue or cease to participate as they please. Usually, they are able to contribute when and how much they want, and can select aspects of production according to their own criteria. In the typically decentralized, non-hierarchical settings, even if participants seek to please and impress peers, they need not cower to a boss or any other such authority. As volunteers, they exercise independence of will, initiative, even self-reliance, discretion and free-spiritedness. No matter what other demands constrain their lives, participation in peer production constitutes an arena of autonomy, an arena where they are free to act according to self-articulated goals and principles. In this arena, they manifest, in Charles Taylor's terms, the virtue of "liberation,"

[12]Peter Simpson, "Contemporary virtue ethics and Aristotle," *Virtue Ethics: A Critical Reader*, ed. Daniel Statman (Washington D.C.: Georgetown University Press), pp. 245–59 at p. 246.

[13]Lester Hunt, *Character and Culture* (New York: Rowman & Littlefield, 1997).

manifest in bearers "directing their own lives, . . . deciding for themselves the conditions of their own existence, as against falling prey to the domination of others, and to impersonal, natural, or social mechanisms which they fail to understand, and therefore cannot control or transform."[14]

Note that when one is speaking of autonomy as a virtue, as an attribute of character, the ambiguity between autonomy as an instantiated property versus a human potentiality recedes as it is unlikely we would value in another the merely presumed capacity to be free. It is actual liberation, actual self-direction, that is admirable in a character. In the context of commons-based peer production, this may mean independence from the wide-ranging commercial entities influencing our actions and choices as well as from the typical array of institutional entities, whether employers, banks, agents of government, or whoever.

B. Cluster II: Creativity, Productivity, Industry

Through their involvement in commons-based peer projects, participants are able to reach beyond the humdrum routines many of us experience in our workdays, including those of us privileged to live materially comfortable lives in industrialized and wealthy nations. Even our recreational choices tend to be passive and limiting, such as selecting among TV channels, watching movies and shopping in malls. While the industrially organized, mass market economy largely structures so many of our choices as comparatively passive consumption choices, or comparatively regimented production choices in fairly controlled work environments, peer production opens up new avenues for creative, productive practices. Few of us will write novels, create encyclopedias or works of art, or produce effective computer programs. Fewer still will do so in their spare time. But peer production offers a medium for contributing our thoughts, our knowledge, our know-how, or merely the spare cycles of our PCs toward a meaningful product.

Peer production offers the possibility of engagement in what MacIntyre terms a "practice," namely, a "socially established human activity through which goods internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially derivative of, that form of activity, with the result that human powers to achieve excellence, and human conceptions of the ends and goods involved, are systematically extended."[15]

In commenting on other forms of peer-based engagement, a broader category that includes commons-based peer production, others have highlighted their

[14]Charles Taylor, "The diversity of goods," *Moral Philosophy: Selected Readings*, ed. George Sher, 2nd edn (New York: Harcourt Brace, 1996), pp. 581–93 at p. 589. Taylor adds, "I have integrity to the degree to which my actions and statements are true expressions of what is really important to me" (p. 589).

[15]McIntyre, *After Virtue*, p. 175.

potential for active rather than passive intellectual and social participation online. Andy Oram, for example, has asserted that, "peer-to-peer technologies return the Internet to its original vision, in which everyone creates as well as consumes."[16] Those engaged in peer-to-peer activities "are active participants, not just passive 'browsers.'"[17] They are writing code, collaborating in community networks, commenting on the news, and so on.

C. Cluster III: Benevolence, Charity, Generosity, Altruism

If the previous two virtue clusters can be considered "self-regarding" virtues,[18] this cluster and the next can be considered "other-regarding," or in Hume's terms, "social virtues." Although each element of this cluster has a distinctive character and is favored in varying measure by theorists and scholars of virtue, their common core is the disposition to benefit others, "to seek the good of others as an end in itself, and in circumstances in which it is not required of us."[19] Among all the virtues, these are central to almost all theories of the virtues and virtue ethics, serving as in David Hume's work, as one of the bedrocks of a general moral theory. Benevolence and generosity require not only that the good of others be furthered, but that a cost be borne by the generous individual alone.

Participants in commons-based peer production benefit others by contributing time and effort that could, in principle, be spent in more directly self-serving pursuits. In helping others, in small ways such as donating spare cycles, or larger ways such as creating carefully researched encyclopedia entries without receiving conventional, tangible payments or favors in return, peers exercise kindness, benevolence, charity and generosity. In the specific case of free and open source software, the literature is ambiguous on the centrality of the role that this cluster of virtues plays. Some, like Richard Stallman, founder of the free software movement, seem more animated by the linkage with virtues in the autonomy and self-reliance cluster, though they also highlight themes of helping friends and neighbors through the sharing of software.[20] Some proponents of open source, trying to bring it into the business world's mainstream, have sought to depoliticize free software by explaining the motivations of participants in terms palatable to believers in *homo economicus*.[21] And yet, many who have worked hard to make open source tractable to economists and business people have

[16]Andy Oram, *Peer-to-Peer: Harnessing the Power of Disruptive Technologies* (Sebastopol: O'Reilly & Associates, 2001), p. ix.

[17]ibid., p. 51.

[18]See Slote, *From Morality to Virtue*.

[19]Hunt, *Character and Culture*, p. 63, for an extensive discussion of generosity and benevolence.

[20]Richard Stallman, "Philosophy of the GNU project;" available at http://www.gnu.org/philosophy/ (accessed April 25, 2005).

[21]Eric Raymond, "Homesteading the noosphere," *First Monday*, 3 (April 1998); available at http://www.firstmonday.org/issues/issue3_10_raymond (accessed April 25, 2005). See also Lerner and Tirole, "Some simple economics of open source."

lauded its underlying "gift culture."[22] Although it is entirely possible that the persistent and pervasive practice of spending time and effort producing something of value and giving it freely to be used by others for no compensation can be explained as self-serving behavior in pursuit of, say, reputation, a more efficient and direct explanation in many, if not most cases, is the pleasure or satisfaction of giving—generosity, kindness, benevolence.[23]

D. Cluster IV: Sociability, Camaraderie, Friendship, Cooperation, Civic Virtue

This cluster of virtues is thematically related to Cluster III, but not identical to it. Cluster III virtues involve giving to others, sometimes needy others, to benefit them—and if Hunt's thesis is to be believed—at a cost to the giver. In this cluster, the virtues also imply giving, but the open-hearted contribution is to a commons, a community, a public, a mission, or a fellowship of which the giver is a part, and the giving dimension might be only one aspect of it. Its core is a conception of the self as part of a collective and of one's efforts as a part of a collective effort, whether the collective or common search for extra-terrestrial life, the quest for a free encyclopedia for all, or for a balanced, popular vision of advanced technologies in society. The giving, therefore, does not merely involve agents parting with something of value, but agents working in cooperation with others to give or produce something of value to all.

Whereas generosity, benevolence, and so on are universally present in the explicit lists of virtues proposed by ethicists from Aristotle to Rosalind Hursthouse, from Xunzi to Martha Nussbaum, the virtues within this cluster are rarely encountered in explicit terms. Although, arguably, they are implicitly present in, for example, David Hume's list of the virtues of "humanity, benevolence, friendship, public spirit, and other social virtues of that stamp,"[24] Hume does not develop the notion of public spirit, nor say much about its relation to benevolence. MacIntyre, too, seems interested in the social contribution of virtues: "The catalogue of the virtues will therefore include the virtues required to sustain the kind of households and the kind of political communities in which men and women can seek for the good together and the virtues necessary to enable us to understand what more and what else the good life for man is."[25] But in extended discussion, he does not develop in detail the relation between political and other communities and specific virtues.

[22]Eric Raymond, *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary* (Cambridge, Mass.: O'Reilly Associates, 1999): "It is quite clear that the society of open source hackers is in fact a gift culture" (p. 81).

[23]See Hunt, *Character and Culture*, p. 192 and fn 5, for interesting points on Aristotle and Nietzsche on productive work and gift giving as valuable both to us and to others.

[24]Hume, *Enquiry Concerning the Principles of Morals*, Sec. I.ii, p. 204.

[25]McIntyre, *After Virtue*, p. 543.

Among political theorists, however, these social, or civic virtues have had greater salience. Defenders of liberalism, for example, have sought to characterize "liberal virtues," including among them the dispositions to engage in voluntary associations and to promote common ends in social cooperation.[26] Michael Sandel, a renowned contemporary proponent of Republicanism, traces the commitment to these civic virtues in the United States back to the founders, who sought to nourish "public virtue" in the citizenry. A complex virtue, public virtue involved a commitment to the public good, or, in John Adams' words, "a positive passion for the public, the public interest, honour, power and glory."[27] According to Sandel, the Revolutionaries valued "public good" second only to liberty, meaning by public good, "more than the sum of individual interests. Accordingly, the practice of politics should be aimed not merely at brokering a compromise among competing interests but to transcend these interests by seeking the good of the community as a whole."[28] In Sandel's account, the founders believed "civic virtue" to be the bedrock of liberal democracy.[29]

In a similar way, participants in a commons-based peer effort cooperate, build upon the work of others, contribute time, effort and expertise to create and enhance a public good. The self-reliance, vaunted by Richard Stallman and other proponents of free software, is not in tension with fellowship—rather, it is only in tension with the incapacity to make do for oneself, and hence reliance on the commercial other to make do for one. The act of creating for oneself and one's fellows is an act both of self-reliance and of fellowship—like barn-raising or establishing a community watch.

IV. FROM STRUCTURE TO VIRTUE

So far, our analysis has established a structural connection between key defining properties of commons-based peer production and the possibility of engagement in creative, autonomous, benevolent and public-spirited undertakings. This is a less ambitious claim than the one with which we set out, namely, that the practice of commons-based peer production is connected to virtue. The remaining sections of the paper will argue that a plausible causal connection can be drawn in two directions: first, that virtue leads people to participate in commons-based peer projects, and second, that participation may give rise to virtue. Based upon these observations, we conclude the paper with some prescriptions for public policy and design.

[26]See, for example, William Galston, *Liberal Purposes: Goods, Virtues, and Diversity in the Liberal State* (New York: Cambridge University Press, 1991). In addition, see Stephen Macedo, *Liberal Virtues* (Oxford: Clarendon Press, 1990).

[27]John Adams, "Letter to Mercy Warren, April 16, 1776," *Warren-Adams Letters*, ed. Worthington C. Ford (Boston: Massachusetts Historical Society, 1917), vol. 1, p. 222, as quoted by Michael J. Sandel, *Democracy's Discontent: America in Search of a Public Philosophy* (Cambridge, Mass.: Harvard University Press, 1996), p. 126.

[28]Sandel, *Democracy's Discontent*, p. 127.

[29]See discussion in ibid., p. 126.

Even if participation in peer production yields benefits to others, contributes to the common good, is a setting for cooperative activity, has the capacity to engender autonomy and so forth, the claim of virtue requires that participants are, in fact, acting generously, exercising autonomy and so forth. Supporting this claim requires more than pointing out that the behaviors benefit others, promote the public good and so forth, but also that they are performed with the right kinds of attitudes and motives. (There is also the theoretical question of the role of motivation in defining particular virtues, which lies outside the scope of this paper.) This issue is not new for many admirers of open source and free software, who continuously seek to account for the motivations of project participants.[30] Establishing the strongest version of the claim, that *all* participants are motivated by benevolence, good-will, fellowship and so forth, is impossible and also unnecessary. Without a doubt, there are many reasons people participate. It will suffice if we are able to show that virtuous motivations are at least a substantial part of the picture.

Laudable actions, in general, may arise out of a variety of motives. We know, for example, that people give gifts for many reasons besides sheer generosity, including a wish to reciprocate, to win favor, to impress onlookers or recipients or to place recipients in the giver's debt.[31] People behave fairly or even-handedly as much out of fear of disapproval or selfish ambition—say, to promote their own professional status—as out of the virtue of justice. And likewise with other virtues and related behaviors. Moreover, it is likely that participants in the projects described above and others like them are motivated by many factors, which may also vary systematically across projects and people and within individuals, over time. Some may be lonely and seeking company, others may wish to promote their chances of a good job, still others may seek the benefits of learning the craft through participation in one of the peer-production projects. None of these reasons is morally reprehensible. But for purposes of drawing the connection between commons-based peer production and virtue, it is crucial that we discover a substantial set of participants whose motivations implicate the four clusters of virtue. Such knowledge is of empirical fact and not purely a matter of analysis.

Despite considerable interest in the issue of motivation, particularly regarding free and open source projects, we found no empirical studies that could rigorously confirm the causal connection between virtue and participation in commons-based systems of peer production. There are, nevertheless, suggestive

[30]See Lerner and Tirole, "Some simple economics of open source." See also Benkler, "Coase's penguin" and "Sharing Nicely."

[31]See such key works on gift giving as: Bronislaw Malinowski, *Argonauts of the Western Pacific* (New York: Dutton, 1950; originally published 1922); Marcel Mauss, *The Gift: Forms and Functions of Exchange in Archaic Societies*, trans. Ian Cunnison (New York: Norton, 1967; originally published 1925); Maurice Godelier, *The Enigma of the Gift*, trans. Nora Scott (Chicago: University of Chicago Press, 1999; originally published 1997).

findings—more than mere anecdotes—that lend systematic support to our thesis. One datum comes from the SETI@home website, where volunteers are asked by organizers to participate in a poll which includes a question about motivation: "What is your main reason for running SETI@home?" Participants are offered a set of multiple choice answers, including an option of "Other," which allows for free form answers as well. With a number of 117,894 participants when the site was last visited the results were:

Find ET for the good of humanity	58.33%
Find ET to become famous	3.08%
Keep my computer productive	16.92%
Get my name on a top 100 list on the web site	2.29%
Other	19.37%[32]

The free-form responses stimulated by the "Other" category were even more telling. As illustrated below, respondents indicated a clear attraction to the opportunities SETI offered for contributing to the public good, for promoting welfare by helping with scientific research, and for the opportunity to be part of an interesting, possibly momentous project. For example:

- "Because the SETI is one of the greatest science programs running and I like to participate in this great search and, of course, for humanity."
- "Support a worthwhile cause. Participate in the largest parallel processing effort."
- "Find ET and it is just plain cool to help with the research."
- "Find ET and to be part of an exceptional distributed computing project."
- "Find ET for good of humanity and prove the net power."
- "Find ET for humanity. Keep my computer productive, and to just be a part of this great project!"
- "Helping out the Scientific Community."

In the context of free software and open source, the rhetoric of movement leaders like Richard Stallman, Linus Torvalds and Eric Raymond clearly endorses the relevance of values such as autonomy, self-reliance, gift-giving, collaboration, active participation, liberation and creativity in motivating participation.[33] These ideological and anecdotal accounts resonate with findings of the Free/Libre and Open Source Software (FLOSS): Survey and Study, the first large-scale study of the role and importance of open source and free software worldwide. Funded by the European Commission and carried out by Berlecon Research and the International Institute of Infonomics at the University of Maastricht, the FLOSS

[32]"Why people are running SETI@home;" available at http://setiathome.ssl.berkeley.edu/motivation.html (accessed December 20, 2002).

[33]Pekka Himanem, *The Hacker Ethic, and the Spirit of the Information Age* (New York: Random House, 2001).

survey and study not only generated primary data on usage and development, indicators of value dissemination and distribution, business models and economic and regulatory implications. It also included a survey of 2,784 developers worldwide on a variety of topics with a section devoted to reasons (or motivations) for participating. A few of the questions drew noteworthy answers.

In commenting generally on the Open Source/Free Software (OS/FS) scene, the greatest percentage agreed that it enabled more freedom in software development. In significant numbers they also cited new forms of cooperation, opportunities to create more varieties of software and innovative breakthroughs. When asked what they thought other OS/FS developers expected from them, the majority said "share my knowledge and skill," a large percentage said "help in realizing ideas for software projects," and in relation to these and other responses a tiny fraction said "provide better job opportunities" and "make money." As to why they began, the highest proportion answered "to learn and develop new skills," closely followed by "to share my knowledge and skills," "to participate in new forms of cooperation" and "because I think that software should not be a proprietary product." As to why they continue, the first is still dominant, though with a smaller margin, while the other three, namely sharing, cooperating and objecting to proprietary control over software, all rise significantly as motivating forces. It is also striking that although a number of other non-moral reasons achieved mid-range scores, the ones that consistently earned lowest were, "to make money" and "to get a reputation in the OS/FS scene."

We admit that neither SETI@home nor FLOSS study results are conclusive. For one thing, they both suffer from the possibility of a self-reporting bias, people wanting to portray themselves as more altruistic than they in fact are. With SETI@home there is the additional problem of self-selected respondents. Indeed, no matter how many participants we survey, or how closely we observe them, we may never prove to the satisfaction of some (diehards) that these benevolent, independent, civic-minded and productive behaviors were performed with the right types of attitudes to qualify for virtue. We share this plight with a host of others, who somehow must prove to skeptics that true altruism or sympathy or generosity exists. Although the burden of so doing strikes us as absurd, it lies outside the scope of this paper to enter this larger debate. A limited conclusion, however, seems credible: insofar as any other-regarding action is possible, there is good reason to hold that a sizable proportion of peer participation is pro-social, or morally praiseworthy in the ways discussed.

The general question of what warrants the move from observed behaviors to assertions about virtue is a core component of most theories of virtue, but lies outside the scope of the paper. It is normally assumed that to assert the presence of an underlying disposition requires not only that the relevant actions are performed, or performed on a one-off basis, but that they are performed habitually. Pitching in, for example, is praiseworthy, but only one who pitches

in regularly is seen as instantiating the virtue of good-fellowship. The projects described earlier and many more provide precisely this type of opportunity for repeated engagement in relevant actions over an extended period of time, so that we can say that those who participate are the kinds of people who give to others with no prospect of direct payoff or punitive sanctions. Such engagement may reasonably be seen by others, *as well as by participants themselves*, as expressions of the associated virtues.

Assuming we have shown that a significant number of participants in peer production are acting in ways that are morally and politically praiseworthy, not only producing utility but doing so for the right reasons and with the right motives, we would like to take our account one step further, suggesting not only that in many instances reliable and long-term participation constitutes evidence of virtue but that participation may also lead to virtue. This causal connection from behavior to virtue is arguably the more interesting one.

For those of us accustomed to conventional philosophical thinking about action as the upshot of beliefs, desires, emotions and so forth, the reverse direction of causation may seem odd. Nevertheless this is widely embraced by virtue theorists and ethicists, who agree that significant sources of virtue include good habits and practice. Grounded also in common sense ideas about the power of good habits, this idea is evident in Leon Festinger's notion of cognitive dissonance, which captures the paradoxical (but ultimately compelling) idea that people's attitudes and beliefs are frequently formed as a consequence of their actual choices and actions and not vice versa. Aristotle endorses the importance of practice in his account of the three sources of character formation: nature, explicit teaching and—most central to our discussion—habit. Virtuous action performed habitually could induce or contribute to the attainment of virtue itself. Because of this, Aristotle recommends that children, in addition to being taught explicitly about the virtues, should be trained to adopt certain habits because "it is our actions that determine our dispositions."[34] Moreover, "[i]t is the repeated performance of just and temperate actions that produces virtue. . . . It is therefore quite fair to say that a man becomes just by the performance of just actions, and temperate by the performance of temperate actions."[35]

Interpreters of Xunzi, the ancient Confucian philosopher, have attributed to him a similar account of the sources of virtuous character. Accordingly, virtuous practice, alongside learning and training in various rituals, is a crucial element contributing toward development of full virtue. Virtue is thus a product of correct practice; and the capacity to act correctly is a step toward virtue itself. Immanuel Kant affirms this principle: "Helping others to achieve their ends is a duty. If a man practices it often and succeeds in realizing his purpose, he eventually comes to feel love for those he has helped. Hence the saying: you

[34]Sher, *Moral Philosophy*, p. 478.
[35]ibid., p. 480.

ought to love your neighbor . . . means do good to your fellow-man, and this will give rise to love of man in you."[36]

The Aristotelian ideal of a dedicated mentor to guide the character development and education of each child is no longer feasible in the contemporary landscape. We rely on a far more diverse and less systematic set of offerings, including the mass media, public education and other social institutions (such as museums, religious institutions and a myriad of others), which serve, directly and indirectly, as sources of learning, training and even character formation. If, as we have suggested, participation in commons-based peer production is an instance of an activity that not only enables the expression of virtuous character but serves as a training ground for virtue, it holds the potential to add to the stock of opportunities for pro-social engagement. With this in mind, we now turn to consider some implications of what we have said for public policy.

V. PUBLIC POLICY

In chapter fifteen of *After Virtue*, Alasdair MacIntyre remarks: "Only in fantasy do we live what story we please. In life, as Aristotle and Engels noted, we are always under certain constraints. We enter upon a stage which we did not design and we find ourselves part of an action that was not of our making."[37] MacIntyre means something quite general about the ways people's lives reflect their distinctive narratives mingled together with those of others, constrained by the stories and experiences of families, tribes, traditions, communities, social, political and cultural institutions and historical circumstances, which together shape choices and possibilities by exposing possibilities and defining good and bad behavior, vice and virtue.

A practical corollary of the observation that social and institutional arrangements have the power to shape human behavior and disposition is to strive for positively valued behaviors and dispositions through purposive interventions in these arrangements. This ambition is not unprecedented either in the actions of political leaders or in evaluations of leaders, policies and institutions by members of the academy.[38] Sandel cites noteworthy historical instances in which stances on critical policy issues, emerging during formative periods of the United States, turned on the potential effects on human character of the alternatives. As an example, Sandel cites George Mason's vehement opposition to the Port Bill to promote development of large commercial

[36]Immanuel Kant, *The Doctrine of Virtue: Part II of the Metaphysic of Morals*, trans. Mary Gregor (New York: Harper & Row, 1969), as quoted by J.B. Schneewind, "The misfortune of virtue," *Ethics*, 101 (1990), 42–63 at p. 60.

[37]McIntyre, *After Virtue*, p. 213.

[38]Contemporary theorists who have explored links between political institutions and virtue include William Galston and Stephen Macedo, as well as Michael Sandel.

cities, which was grounded in the belief that development would undermine the moral virtue of residents, diminishing their "frugality, probity and strictness of morals."[39] According to Sandel, such arguments would not have been out of place for the environment in which there was general agreement regarding the principle that: "The public life of a republic must serve a formative role, aimed at cultivating citizens of a certain kind." The government was seen to have "a stake in cultivating citizens of a certain kind." The Constitution of 1787 was another vehicle designed to save "American republicanism from the deadly effects of [the] private pursuits of happiness," and "from the acquisitive preoccupations that so absorbed Americans and distracted them from the public good." In addition to policy and the Constitution, there would be other public institutions aimed at "improving" moral and civic character, from "education, to religion, and more broadly, to the social and economic arrangements that would define the character of the new nation."[40] It goes without saying that the argument supporting the role of social and political institutions in shaping character is separable from substantive beliefs about what counts as virtue.

In *Character and Culture*, the philosopher Lester Hunt shares insights into ways the design of social institutions may influence the development of virtues. He writes:

> [T]here are some virtues that it is comparatively easy to acquire and instill in the context of American institutions. At any rate, parents who are trying to get their children to respect the property of others or keep their promises probably do not so often have the feeling that they have the whole world working against them. Our institutions do seem to be arranged so that they facilitate the acquisition of some good traits of character. . . . We may find, for instance, that some of the limits to the powers that moral instructors possess are not due to the immutable facts of human nature but to institutions that we have the power to change. Perhaps people are no more generous or just than they are, no less envious and vengeful than they are, because of the institutions that influence their behavior, and not because the guardians of virtue—whoever they may be—have failed to be sufficiently vigilant or skillful.[41]

The institutions Hunt has in mind may be loosely construed as cultural rituals like gift-giving, or explicit regulatory vehicles as in the historical cases Sandel discusses, or contemporary counterparts such as tax-deductions for charitable gift-giving. As Hunt observes, the virtue-enhancing properties of any given social institution are complex and subject to a variety of contingencies:

> A theory of the origin of a trait of character does not state that from a specific concrete situation, in all its complexity and with all the features of it that individuals might perceive and to which they might respond, one specific result must emerge. Rather, it picks out certain features of many actual situations—as, for instance, that

[39]Sandel, *Democracy's Discontent*, pp. 125–126.
[40]ibid., quotations from respectively, pp. 127, 131, 129 and 133.
[41]Hunt, *Character and Culture*, p. 150.

> the people in them are taught a certain type of rule—and shows that these features support the formation of certain traits of character.[42]

Accordingly, the efficacy of the virtue-enhancing properties of commons-based peer production will, likewise, be tempered by contingencies of the highly variable background conditions in which participation takes place.

The past few decades of the philosophical and social study of technology (STS) has shown, however, that it is possible to give a more concrete interpretation of MacIntyre's remark by considering the stage not only as a social context but as the material context, designed by others, into which we must enter. For the philosophers and social scientists who study technology, this metaphor draws attention to a world in which we are constrained not only through the narratives and expectations of the self and other social agents and institutions, but by the material world which is constituted in increasing measure by technology. From Lewis Mumford's authoritarian and democratic technics to Marshall McLuhan's medium as a shaper of content, to Langdon Winner's artifacts with politics, to Bruno Latour's inscription of morality in machines—each of these expresses the common idea that technical systems and devices, in virtue of their properties, architecture or functionality, have the capacity both to limit and to facilitate what individuals and collectivities are able do.[43] Rejecting the view of technology as neutral, producing outcomes only as a result of the uses and applications chosen by people, these theorists of technology, and others, hold that technology embodies values. Values may be "built into" technical design characteristics of technologies, which, in interaction with the social, political, economic and cultural characteristics of the contexts in which they are embedded, produce outcomes skewed in one way or another. In drawing attention to the ways technologies enhance or suppress social, political and moral values, these philosophers, legal scholars and social scientists frequently see their work as continuous with social, political and moral commentary. Brian Pfaffenberger observes:

[42]ibid., p. 186.

[43]Significant works that explicate related ideas include: Langdon Winner, "Do artifacts have politics?" in *The Whale and the Reactor* (Chicago: University of Chicago Press, 1986); Lawrence Lessig, *Codes and Other Laws of Cyberspace* (New York: Basic Books, 2000); Joel Reidenberg, "Lex informatica: the formulation of information policy rules through technology," *Texas Law Review*, 76 (1998), 553–93; Philip Brey, "Disclosive computer ethics," *ACM SIGCAS Computers and Society*, 30 (Dec. 2000), 10–16; Batya Friedman and Helen Nissenbaum, "Bias in computer systems," *Human Values and the Design of Computer Technology*, ed. Batya Friedman (New York: Cambridge University Press, 1997), pp. 21–40; Lucas Introna and Helen Nissenbaum, "Shaping the web: why the politics of search engines matters," *The Information Society*, 16 (2000), 1–17; Yochai Benkler, "Communications infrastructure regulation and the distribution of control over content," *Telecommunications Policy*, 22 (1998), 183–96; Bruno Latour, "Where are the missing masses: the sociology of a few mundane artifacts," *Shaping Technology/Building Society*. Eds. W. Bijker and J. Law (Cambridge, Mass.: MIT Press, 1992), pp. 225–58; Lewis Mumford, *Technics and Civilization* (New York: Harcourt, Brace and World, 1934); Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964); Neil Postman, *Amusing Ourselves to Death* (New York: Viking, 1985).

> All around us today are artifacts that were generated in the technological dramas of their time: railways, canals, aviation artifacts, radios, and more. And yet their meaning, together with their location in what was formerly a deeply felt grammar of political action, is utterly lost; in their place is what appears to be nothing more than a material record of "technological progress." What was once the conscious product of human cultural and political action, passionate and meaningful, is now a silent material reality within which we lead our daily lives, mutely acting out patterns of behavior that once had obvious connections to the root paradigms of our culture. . . . To become fully aware of the political circumstances of their lives, new generations of students, at every level of education, must be trained (as Hughes suggests) to 'fathom the depth of the technological society, to identify currents running more deeply than those conventionally associated with politics and economics.' Because STS offers a way to recontextualize technological artifacts, it is therefore the political philosophy of our time, and it deserves to stand at the center of any curriculum that teaches political awareness and civic responsibility.[44]

In other words, technical systems and devices are as much a part of political and moral life as practices, laws, regulations, institutions and norms that are more commonly seen as vehicles for moral and political values.

The political aim of this paper is similar to those pointing to social or political consequences of specific technical systems, for example, those warning of privacy threats posed by pervasive video and data surveillance and biometric measurement technologies, diminishment of autonomy and accountability due to automated command and control systems and alterations in hierarchies of power and authority due to design features of certain network infrastructures. Unlike many political analyses of technologies, however, ours does not warn of a direct threat of harm. Rather, it warns of a threat of omission. We might miss the chance to benefit from a distinctive socio-technical system that promotes not only cultural and intellectual production but constitutes a venue for human character development.

Some might challenge the underlying premise, arguing that "low-cost" contributions to the public good, such as those afforded by commons-based peer production, are not capable of training virtue. Because an inherent feature of these production schema is to facilitate contribution at relatively low personal cost, its virtue-enhancing capacities are questionable. This characterization misses the point. As noted above, commons-based peer production generates new modes of contributing to the public good by facilitating the collaborative engagement of thousands of ordinary individuals in the voluntary, creative, communal, regular, non-commercial production of intellectual and cultural goods, for a wide variety of reasons and motives. There are also many different *types* of projects, demanding highly variable degrees of effort. Whereas some, such as SETI@home, call for relatively low levels of engagement and effort,

[44]Brian Pfaffenberger, "Technological dramas," *Science, Technology and Human Values*, 17 (Summer 1992), 282–312, in part quoting Thomas P. Hughes, *American Genesis: A Century of Innovation and Technological Enthusiasm, 1870–1970* (New York: Penguin, 1989), p. 4.

others such as Wikipedia[45] call for significant commitment, work, time, patience, dedication, fairness and civic-mindedness.

Effort (or cost) may be a requirement for moral action but it is surely not boundless; effort may be required, but not supererogation. Where to draw the line is not a question we need settle here, except to observe that moral action lies somewhere between the extremes of no-effort and supererogation, and is surely also a function of the good it engenders. There is no reason to appraise participation in peer production any differently. Accordingly, although what critics say may apply to a fraction of the cases, it certainly does not apply to all when we take into consideration the effort involved, the good produced and the widely shared intentionality and self-understanding as providing that public good. When a society endorses social policies that, for example, offer protection to whistle-blowers, provide tax-credits for charitable donations, or generate institutional safeguards against corruption, it is not shrinking the moral sphere, but structuring the environment to lessen the burden of valued practices. In a similar way, commons-based peer production opens a path previously restricted by economic cost and industrial organization to small numbers of professional producers of information, knowledge and culture to large numbers of ordinary people, enabling them to contribute to the public good in a particular domain. The path does not bypass virtuous action, but generates new opportunities for it.

Despite the positive potential of commons-based peer production, there is cause for concern over its future flourishing. The primary sources of resistance are rent-seeking behavior by incumbent firms of the industrial information economy and well-meaning, but ill-informed policies and judicial decisions. The former stems from the fact that commons-based peer production presents an alternative to, and therefore a form of competition with, the incumbents. The latter arises because policy makers and judges have been habituated by the twentieth-century economics of information production to think that market production, in particular established firms, are critical to growth, innovation and creativity. Relatively few have adjusted to the new economics of networks, and recognized the potential and value of peer production.

The most visible conflict between commons-based peer production and incumbent firms is in the area of free or open source software. Here, FLOSS is seen as a potential alternative, and is actively supported and used by major corporations and many governments. This has led Microsoft, in particular, to try to resist these developments.[46] More subtle is the way in which the incumbents of the cultural industries, in particular Hollywood and the recording

[45]Joseph M. Reagle Jr. "A case of mutual aid: Wikipedia, politeness, and perspective taking;" available at http://reagle.org.joseph/2004/agree/wikip-agree.html (accessed April 25, 2005).

[46]Joe Wilcox and Stephen Shankland, "Why Microsoft is wary of open source," News.com, June 18, 2001; available at http://news.com.com/2100-1001-268520.html?legacy=cnet (accessed April 25, 2005).

industry, have successfully lobbied Congress and litigated in courts to expand copyright and to introduce new related technical requirements—like the Digital Millennium Copyright Act of 1998 and the persistent efforts to pass hardware regulation. While these efforts have mostly succeeded in allowing these firms to extract higher rents from their inventories, they impose higher entry barriers than is necessary to the public domain. Because all information production requires access to existing information inputs, these constraints on the public domain create barriers to effective pursuit of peer production. While not always aimed directly at peer production, these efforts raise the costs of maintaining information production activities and dampen the development of some technologies that can be useful to peer production, as well as to other peer-to-peer uses that are more legally controversial—like music file-sharing.

VI. CONCLUSION

We have argued that participation in commons-based peer production fosters important moral and political virtues. We have not made the case that it is therefore incumbent upon the state to support peer production. That would require a greater commitment to a perfectionist state agenda than we have stated or defended here, or are willing to defend. Nonetheless, we have offered new reasons to find peer production to be a morally attractive set of social, cultural and economic practices. There is a growing literature on the relative efficiency of peer production in many domains of information production, and some exploration of its attractiveness from the perspective of a variety of liberal commitments: to democracy, autonomy and social justice.[47] Here we have contributed additional reason to think that peer production is normatively attractive. For those who hold one of a broad range of conceptions of virtue, peer production can be said to provide a social context in which to act out, and a set of social practices through which to inculcate and develop, some quite basic human, social and political virtues. It is in light of the whole picture that we recommend vigorous support for this exceptional socio-technical phenomenon that serves not only as the source of knowledge and information but as a platform for virtuous practices and the development of virtue in its participants.

[47]Yochai Benkler, "Freedom in the commons: towards a political economy of information," *Duke Law Journal*, 52 (2003), 1245–76.