Preface

INTRODUCTION

“Open source” approaches to the world of content development and sharing is highly contested. A majority of business models in the world require high-level control of all intellectual property (IP) and the need to develop and produce in proprietary ways. Without this regime, the global economy could not function. Research and development (R&D), which is expensive to fund, is highly protected, and employees work for such companies after having signed various non-disclosure and non-compete agreements. Certainly, there is a role for maintaining secrets and ensuring that these are not lost to leakage, espionage, or inadvertent sharing.

The role of “open source,” though, has its place. Open source refers the transparency of released code for all to view and access. It refers to the collaborative building of a shared product for the benefit of a larger populace—often without user cost (but with outsized contributions by the open source developers and sponsoring organizations). Open source refers to projects that are designed and developed under the auspices of the general public, without necessarily having a commercial patron or sponsor; it can also refer to projects that are collaborations between open source developers and commercial entities with an interest in a particular product.

Theoretically, it may push out the productivity of a society—by affecting the Pareto efficiency curve (a conceptualization that represents the cumulative output of a society given limited resources and the societal strategies for the allocation of resources). This curve is conceptually achieved when no one may be better off without making someone else worse off. This assumes that all resources are used in the maximal ways possible—with excess unallocated resources—in a kind of zero sum situation. Another conceptualization of the production possibility curve looks at a society’s investments as butter (civilian expenditures) and guns (defense expenditures). There are trade-offs between choices in a nation-state’s allocations. Open source, if it captures wide popularity, has a potential to push out the production possibility curve for both guns and butter because of the nature of innovations. New technologies and methods of work may benefit multiple aspects of a society.

Open source refers to any number of digital contents (software, authoring tools, digital learning objects, photos, video, audio, and other objects) released to the public through a fairly new brand of copyright release. On another level, open source manifests as an idealistic social movement of open-sharing. Given the interdependence required between developers and users and other stakeholders, open source creates social cohesions (and divisions) in electronic spaces.
Some Enablers of Open Source Development

In a competitive profit-driven market, open source enables parallel development tracks of digital resources that would not be produced otherwise. At core, the broad phenomena of open source development and sharing fulfill basic structural needs in human productivity. Open source combines both for-profit and non-profit endeavors in shared projects that benefit users and bring something to market much faster than it would otherwise. Such endeavors also enable the creation of digital resources that would not exist otherwise. The effects of such open source also set standards for proprietary products and has been argued to make the de facto price of a good “free” in a rush to the lowest cost object.

Open source endeavors tap the so-called wisdom of the crowd on the one hand particularly for general by-product sorts of contributions. Then, too, this taps those with unique skill sets in particular domains. Subject matter experts, in-betweener, and novices may collaborate around shared virtual development endeavors in distributed communities of practice, which benefit these groups with new learning and innovations. These endeavors provide informal ways for people to develop their respective talents and to broaden their skill sets. The benefits of sharing in open source spaces may benefit people’s development of individual interests as well as their professional development. Open source development projects and sites may provide opportunities for self-discovery and collaborative learning—as an incubator for talent.

The creation of open source resources also enables the expression of altruistic impulses and endeavors so that the work of many may benefit the larger global environment. (Research suggests that the developers are a very productive elite minority who carry an undue work load. This phenomenon is depicted in a power curve, but the users of their efforts are many.) In a world with plenty of information hierarchies (consider the numerous databases that require payment for access), and elite access to higher education (access to the means of production for high-end knowledge), this is one of haves and have-nots. World demographics suggest that there are many youth coming of age who will not have access to university educations, and open source learning resources may be part of a larger solution for such social needs as education. To maximize the uses of time and the development of human talent, such open source works may enable people to achieve part of their full potential. Open source learning offers greater paths of entry to various types of learning, both formal and informal.

Finally, open source also enables the fostering of user communities based around particular technologies or resources. The building and maintenance of such communities strengthens the work of the developers by offering the insights of a group of users who may provide feedback, documentation, and bug finds that strengthen the overall work. The mixing of developer and user communities around particular resources enable the forging of human connections and ties over distance and their shared expressiveness with each other. While there is an assumption that “free-riding” cannot continue forever as a sustainable model of interaction, it is probable that some will never transition from such status to developer and contributor status. Users can contribute by their mere usage of the tool, resource, or contents.

For all the goodwill in the world, these talents and energies would not be so easy to tap if it were not for the affordances of various Web 2.0 and other collaborative technologies. Further, it may be helpful to consider that if one had to pay for some of these open source works, one would likely not have sufficient funds to cover the actual costs of development. Human expertise is expensive to develop, and it is expensive to deploy.
Open Source Technologies

What has enabled these broad phenomena of open source development and sharing, and virtual community building, has been a harnessing of the connectivity of the Web and the Internet with a broad range of technologies. There are collaborative work sites which enable individuals to coordinate their work and the submittal of that work (such as open source technology platforms to develop open journals, publications, and books; collaborative work sites that enable web conferencing, texting, mutual annotations of shared work, and work archival such as learning/course management systems and other integrative work spaces). These systems enable project leaders to track people’s contributions and to authenticate identities and histories. There are digital libraries and repositories (and referatories) that enable peer-to-peer sharing of resources (like audio, video, photos, multimedia, learning objects, software code, and digital collections, among others). General collaborative tools—like web conferencing tools, instant messaging tools, text messaging, voice over IP calling, micro-blogging, blogging, and wikis—may be used to harness people’s creativity and to encourage collaboration. These technologies are broadly scalable and may be applied to various circumstances for various types of problem-solving and co-development. Digital resources, by their nature, also do not degrade across multiple uses of the same resource, or in the economics parlance, non-rival goods. Once the marginal investment has been made in the resource, the making and distribution of future copies is economically negligible.

Beyond Computer Code Development

While code developers opened the way with open source licensure and various software programs (operating system, server software, learning management systems, authoring tools, editing tools, games, simulations, and others), other parts of society are beginning to follow suit. Lawyers have established broad-based licensure releases. In higher education, there is the sharing of open-courseware with full university curriculums shared in zipped files; high-end digital learning objects; games and simulations; and other digital resources. There are open source learning communities. There are massively open online courses with open-sharing of live learning.

An Afterthought or Byproduct

The broader public has taken to sharing the products of their creative labors in terms of various types of art. People share photos that they take on trips. They use their web cams to capture themselves sharing various talents and ideas. Others blog about various interests and types of expertise. In a sense, open source has become a people’s movement—based on a groundswell of sharing and interpersonal relating, some shared values of egalitarianism and fair access and quality. Citizens offer informal reportage—first-person narrations, videos, audio, and other resources. For many, this is the low-hanging fruit, the product of moment-by-moment inspirations. People share their skills, digital objects, information, and beliefs and attitudes. In general, these objects are not monetized, and even if they are, sharing such resources is not particularly lucrative.

This suggests a challenge in terms of creating communities that encourage the development of quality information—not misinformation, not irrelevant information, and not environmental “noise.”
The phenomenon of open source allows plenty of levels of access and types of expertise. In wikis, whole communities of individuals will self-monitor and self-correct each other. They will conduct rollbacks to erase others’ insights if they do not meet particular standards. Elitist collaborations are for those who enter by invitation and who then collaborate around limited challenges.

More Formal Open Source Sharing

Large companies have funded co-shared open source development in order to sell hardware platforms or software. However, beyond proprietary and commercial interests, there may be more formal open source development for the purposes of public relations (such as universities that share open courseware). Universities are also supporting open source publications and digital learning objects to show their commitment to e-learning quality and their concerns for the larger learning of the society. Some non-profit organizations support the creation of open source development as an afterthought or workplace byproduct. Some consciously fit this model into the business discipline of the organization—particularly on information that has broad appeal and interest and the potential for broad social good (such as public health, foreign language learning, financial management, environmentalism, and other topics). For those who want to create open source contents from their work places, it’s critical that they have the necessary political cover and resources to pursue such work.

Some open source publishers have both a commercial wing and an open source one. The commercial division puts out published works and articles in repository formats—for subscription. However, they also have public sites that offer open source books in digital format for free download. The open source channel offers other ways for information to be shared, and they may drive traffic to the commercial side of the publishing house. Open source channels may help raise the profile of a publisher as well.

Starting out as Open Source Object Users

While some acculturate to open source as developers, others begin first as open source resource users. These are individuals who may peruse open source encyclopedias; download open source images; learn from open source columns; play open source games; edit through open source editing tools; and use a variety of digital tools made available through open source means. They benefit off of others’ expertise and largesse. What open source users may take away from these learning objects is manifold. They may learn something about others or a particular phenomenon. They may be entertained.

There have been professional attempts to ride the publicity wave and to create viral enthusiasms through word-of-mouth. There are contrived multimedia games. There are “grassroots” endeavors that turn out to be “turfgrass” (artificial) instead. Numerous professionals have interests in reaching out to the general public in order to affect their choices and behaviors. Open source may be one channel to reach potential users.

Even if information wants to be free, not all of it will flow through open source channels into public spaces. Proprietary information will not be released into public because of the compromise in competitive advantage if anything is leaked. Research and development (R&D) data or anything that can be monetized will be protected. Anything that may compromise security will be carefully protected, potentially embargoed into perpetuity. And yet, to generally have an impact on the larger public, resources and information have to flow outward to the public, so there is plenty of pressure pushing outward. There is space for protectionism, but there has to be space for sharing as well.
As open source production becomes more main stream, there has been a shift in cultures. It’s not just information and contents that are easily created and disseminated; rather, these also consist of more high-end middle works between the massive software projects and the incidental digital artifacts from people’s lives. Such works will take more investments of time and complexity to create. They will require specific skill sets and expertise. To find an audience, such objects need to be shaped for particular delivery, and they have to be sent through the proper channels to find their audiences. Audiences have to be created and nurtured. Within this open source ecology, people all have their mixed and individual roles. They are users and developers. They may dabble in public relations or project management or research, but they may be expert in development or scripting work. People combine skill sets on various ad hoc teams in open source.

While this phenomenon of open source started out in a liberal democratic political context, this meme and practice goes well beyond such conceptualizations. At the core, this is about human collaborations for the benefit of themselves and others. It is about making education and information more broadly available to others. It is about more fair access to digital resources. The hopes of many are riding on this phenomenon. Even those in private industry have R&D and other projects that tap into open source development and product lines. One example would be the widespread cultivation of app developers for many makers of tablet devices.

The Need for Open Source Quality

The superficial culture around open source might suggest that the masses prefer sensationalistic experiences that go viral. There may be a sense of value to prolific creativity, regardless of quality—just to get hits on a name. There might seem to be a value to gimmickry to drive traffic. And yet, quietly, underneath all the buzz and hype, there are open source collections of valuable information and destination sites that are the ones that define the state-of-the-domain-field. These are the spaces that offer actual and unique informational value and further transference of value to learning uses for others. These are the spaces that will be long-lived and will optimally offer continuing value. These are the spaces of particular interest in this book. While the Internet enables Long Tail diversity and specialization, the core audience still has foundational open source needs that are in the mainstream, and these are the users that most developers will target.

Fundamentally, open source quality may mean a variety of things—depending on the open source contents. One general feature may be the importance of accurate labeling or metadata or annotation. Digital objects require a clear sense of origins. Automated information captures such as the exact latitude and longitude of an image capture may be done automatically by a digital camera or sensor device. Others endeavors will require human interventions to capture the information to properly identify and label objects. For example, a photo may show people in a physical space, but without further explanations, their context and the relevance of their gathering may not be clear. Other quality features of open source objects may involve fidelity and authenticity particularly for photo-realistic imagery. Common practices here suggest that there should be objective size indicators of an object. This focus on authenticity also assumes a kind of non-manipulation, such as not “jumping” color (a common practice in commercial media post-production). Another quality feature may involve the informational value or uniqueness of the information. (For all the hundreds of millions of open source images available online, there are numerous other requirements for specific images that go unfulfilled.) For open source digital learning
objects, the learning value of the resource may be important, which suggests proper instructional design, development, and delivery. Depending on the types of digital objects, there may be varying objective quality standards that will be defined by the professional practitioners in the field and the users in the field.

The concept of formalizing open source contributions suggests that content developers have to be accountable for their creations and the effects (to a degree) of their works in the larger environment. This has to be achieved without the super-structure of a workplace or financial incentives, but possibly within the guidelines of applicable laws. Peer evaluations and reputation offer some leverage to create quality, but these still vary in effectiveness—particularly when people who create such contents may be using pseudonyms or handles that may separate themselves from the work that they actually do. Some open source endeavors are fly-by-night. Currently, the development supply chains for open source goods lack a formalism that might ensure a professional-level of follow-through and quality management. However, a popular understanding is that too much formalism may squelch the culture of open source and the good will and talent which fuels the endeavors.

**Text Objectives**

Initially, the conceptualization and ambition for the text was to touch on a range of issues. Foremost, this was to highlight ways to design virtual spaces to enhance the creation of quality open source contents. This would entail the design of technologies but also the virtual leadership and coordination needed to actualize such endeavors. Another objective was to study the motivations of those who create open source contents, with the idea that their contributions may be better elicited and facilitated. There was the understanding that virtual communities may be harnessed to nurture open source creativity. I wanted this book to examine the hierarchy of open source resources and information available and the process of how such digital collections are collected and often curated (directly or indirectly) for quality. Then I also focused on the user community—the ways that such users are cultivated and maintained, and then, too, how they actually find and vet open source learning resources and integrate and use them. As a subcategory of open source development, mixed open source endeavors combine both for-profit investments and good-will development. Finally, I also wanted a focus on the role of open source in higher education (and informal and self-discovery learning and education) and the affordances there. There were hopes that others would propose ideas that would break the anticipated areas of interest. At the far edges, some proposed topics in the draft outline included possible works on open source legal structures. Another thread involved open source resources for K-12 learning.

As it has turned out, *Open Source Technologies for Maximizing the Creation, Deployment, and Use of Digital Resources and Information* has touched on all of these factors but in varying degrees. This is to be expected. Whatever the initial plans and no matter how wide the solicitations for writing, authors necessarily have to write from their own professional and personal experiences. Nothing can truly be written to order. These initial manuscript objectives may still, in a sense, serve as a general approach to what may be explored. The contributions of the authors in this collection point the way to fresh directions in this area as well. These ideas will be discussed further on in this introduction.
AN OVERVIEW OF THE CHAPTER CONTENTS

This book is organized in four different sections. The first, “Section 1: Foundations to Open source Development” sets a baseline of understandings about open source, based on theory and analysis. “Section 2: Open source Development in Higher Education Practice” highlights in-world experiences with open source development and live education projects. “Section 3: Open source in the Wide World” focuses on global-level open source projects with objectives that go well beyond the ivory tower. “Section 4: Developing the User ‘Installed Base’ for Open source Resources” provides perspectives on the users of open source and the work of meeting their needs.

“Section 1: Foundations to Open source Development” offers a mix of challenges and new understandings about open source in education. More specifically, in the opening chapter “A Model of Cultural Competence in Open source Systems,” Dr. Doris Carroll challenges those working in open source to build with cultural competencies in mind for greater accessibility of open source resources and communities. In Dr. Dimitris Kavroudakis’ “Open Source Approach to Contemporary Research: The Case of Geo-Information Technology,” he examines the influence of the open source paradigm in research and knowledge creation, with a specific focus on the geo-information technology area. In Dr. Yolanda Debose Columbus’s “Facilitating the Integration of Open Educational Courses,” she describes the cultural adaptation work necessary to integrate open educational resources into higher education programs and offers a framework to enable that process.

Dr. Gladys Palma de Schrynemakers, in Chapter 4, “Creating a Digital Learning Community for Undergraduate Minority Science Majors,” argues for increased use of open source resources to create virtual communities to improve learning for minority science majors. In Chapter 5, “Analyzing the Competitive Dynamics in Open Source Publishing Using Game Theory,” Dr. Shalin Hai-Jew analyzes the dynamics in open source publishing and the competition between such publishers and proprietary ones—using a game theoretic model.

“Section 2: Open Source Development in Higher Education Practice” focuses on some applied cases of development. Dr. Lee Chao highlights the work of setting up an open source virtualized networking lab in Chapter 6, “Virtualized Open Source Networking Lab” to enhance information technology (IT) education. Dr. Jason Caudill, in “Deploying Digital Educational Resources with Free and Open Source Technologies” highlights the importance of open source resources in the constrained budgetary environment of higher education. In Chapter 8, “Building Open Source Resources for Online Learning in a Higher Education Environment,” Dr. Hai-Jew argues for the co-creation of open source learning objects and resources in higher education, which is a center of online learning and digital learning object creation. Sue Polyson Evans, CEO and co-founder of SoftChalk, LLC, has contributed a sidebar Q&A on the SoftChalk Cloud repository. Dr. Ramesh C. Sharma provides a high-level overview of some of the open source endeavors in India in Chapter 9: “Open Source for Higher Conventional and Open Education in India.”

In “Section 3: Open Source in the Wide World,” Dr. Peter B. Swanson describes the uses of economical digital tools to measure the foreign language proficiencies of second-language learners, in “Measuring Language Learners’ Speaking Proficiency in a Second Language Using Economical Digital Tools.” Peter Costa and Dr. Deborah J. Briggs, in Chapter 11, “Open Source Educational Initiatives to Improve Awareness of Rabies Prevention,” describes innovative uses of open source technologies to disseminate critical and life-saving information in the global push for rabies control. Dr. Roger W. McHaney, in “The Web 2.0 Mandate for a Transition from Webmaster to Wiki Master,” describes his evolution
in thinking and practice in serving as the wiki master for the E-Learning and Teaching Exchange wiki (ELATEwiki). In Chapter 13, “Creating Open Source Interactive Articles for the Wider Publics,” Dr. Hai-Jew describes a new and interactive form of immersive digital articles in open source journals using a range of technologies. Brent A. Anders, in Chapter 14 “Creating a Video Based Education Game: A How-To Guide,” provides insights on an open source global public health game that was created for dissemination to a wide audience.

Finally, in “Section 4: Developing the User ‘Installed Base’ for Open Source Resources” focuses on the criticality of meeting the needs of users of open source resources. Dr. William H. Hsu, in Chapter 15: “Creating Open Source Lecture Materials: A Guide to Trends, Technologies, and Approaches in Information Sciences,” offers a professor’s view of how open source resources enhance the work of education in the information sciences in this engaging qualitative meta-analysis informed by firsthand professional experiences. Dr. Kathryn Moyle eloquently discusses the importance of providing options for school principals in opting in to open source resources in “Aligning Practice and Philosophy: Opening up Options for School Leaders.” Finally, Dr. Hai-Jew describes the analytical work that goes into “Selectively Employing Open Source Resources for Online Learning” in Chapter 17.

The Future of Open Source

Every publishing project involves plenty of learning. This was so in this case as well. I have learned that it does take plenty of design in socio-technical spaces and virtual leadership and nurturance to enable the development of quality open source resources and information. Such work also happens in the context of talented peers; good work does not happen in a vacuum. Open source content developers work hard to share and distribute innovations. The users of open source contents also contribute much to the process in terms of development work as well as support for the developers. The non-profit organizations, companies, and institutions of higher education that support open source content development are critical players in proving the political and resource spaces to achieve important open source work.

Still, the core players are the subject matter experts (SMEs) who are willing to spend their time, talent, and treasure in generous ways with the general public—to make the world a better and more sharing place.

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