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Analysis of open source principles in diverse collaborative communities

by Jill Coffin

Abstract

Open source culture and practice emerged as software hackers took control over the production, ownership and distribution of their skilled work. This revolution, quiet and unnoticed by most, began over twenty years ago. Along the way, free and open source software hackers developed organizational and dialog structures to support their ethos, creating a successful model for collaboration. This paper applies traits common to successful free software and open source hacker communities as a framework to analyze three non-hacker collaborative communities.

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Introduction

“A new society emerges when and if a structural transformation can be observed in the relationships of production, in the relationships of power, and in the relationships of experience.”

— Manuel Castells [1]

Open source culture and practice emerged as software hackers took control over the production, ownership and distribution of their skilled work. This revolution, quiet and unnoticed by most, began over twenty years ago. Along the way, free and open source software hackers developed organizational and dialog structures to support their ethos, creating a successful model for collaboration.

This paper applies traits common to successful free software and open source hacker communities as a framework to analyze three non-hacker collaborative communities. These traits were distilled from my analysis of various open source communities including the Linux, Debian and Mozilla communities. While this framework may not tell the complete story of these communities, the analysis yields observations relevant to the design of collaborative systems. The framework consists of the following characteristics of successful free software/open source communities:

- open and widespread membership based upon participation
- geographically distributed, asynchronous, networked collaboration
- project transparency, particularly open, recorded dialog and peer review of project materials,
- discussion and decisions
- a compelling foundational artifact to organize participation and build upon
- collaborative, iteratively clarified, living documents and project artifacts
- a mechanism for institutional history
- a community-wide sense of project ownership
- a hybrid political system based upon meritocracy
- a trusted benevolent dictator, typically the project founder
- foundational developers and early adopters who, along with the benevolent dictator, set project ethos

- consensus as a decision-making tool
- upholding the right to fork.



Wikipedia

Wikipedia is a popular online, collaboratively written, free content encyclopedia initiated in 2000. Like code, Wikipedia has a modular structure, in this case composed of encyclopedia articles. This structure enables parallel development along a multitude of specializations. The modules are iteratively written, peer-reviewed, and together reflect the consensus of collective intelligence through individual transactions.

The Wikipedia project leverages open source wiki software to both organize content and participation. This platform enables an accessible, networked connection between the project and geographically distributed participants. The wiki platform provides participants with tools and a place to work. It also structures the nature of the work.

Ward Cunningham built the first wiki, *WikiWikiWeb*, in 1995 to host the Portland Pattern Repository, a collection of problem and solution archetypes for computer programming (Cunningham). Cunningham's design supports social, political and conceptual phenomena conducive to successive, distributed collaborative projects. *Wiki-wiki* is a Hawaiian term meaning *quick and easy*. Wikis impose a minimal barrier to participation through a simple text markup system and uploads which do not require server login.

Wikis support a mesh network of hyperlinked modules of content. Each module contains two additional layers for module history and discussion specific to the module's content. This structure is important. The history layer of the module serves as a versioning system that records iterations and can be used to revert the module to an earlier, perhaps more stable, state. The discussion layer facilitates open and transparent negotiation of consensus about content, allowing contributors to voice their opinions and sometimes assert their identities without affecting the content layer. Because the discussion layer is part of a content module, discussion stays on topic. Both the history and discussion layers form the institutional history of a project, making decisions and protocol transparent.

Openness and transparency are central to the functioning of the Wikipedia project. As a matter of Wikipedia policy, anyone, including an anonymous user, is permitted to directly edit any module on any subject. Wikipedia participants, like free and open source software hackers, are personally motivated to contribute. Participation is voluntary and is the sole condition for membership in the community. Instead of going through a moderation process, contributions become immediately visible on the site, providing immediate satisfaction for participants. Ownership of the work is distributed throughout the community. Contributor names do not appear on entries, although discussion and history layer entries are typically signed with user names.

Contributions are recorded in the history section of a module. They are peer-reviewed and either contribute directly to an iteration of an entry, are modified or are deleted. Reviewers debug edits according to consensus recorded on the discussion layer of each module. Because the discussion layers are the only forum for dialog (a benefit of geographically distributed, asynchronous, networked collaboration on a dedicated platform), discussion is open to all participants and decision-making is transparent.

Transparency is important to the success of Wikipedia because it allows participants to understand the reasoning behind decisions, contributing to trust in the Wikipedia process. It also allows newbies a means to understand informal community protocol and culture, as well as reduce abusive practice. While formal procedures exist to limit members who violate project mores, these measures are rarely necessary. Peer pressure typically regulates behaviour before administrative actions are needed. Participants self-manage and are usually not subjected to organizational authority.

Openness and transparency contribute to the success of the project in additional ways. Schlock and chaos are avoided due to the watchful eyes of the many, exemplifying Linus' Law, coined and articulated by hacker Eric Raymond as "Given enough eyes, all bugs are shallow" (Raymond, 2000). As anyone can edit Wikipedia, vandalism does occur. On the other hand, because anyone can edit Wikipedia, Wikipedia is robust. IBM's Collaborative User Experience Research Group found that most Wikipedia pages have been vandalized. These researchers also found that most pages were repaired through version rollback using the module histories so quickly that most users would never see the effects (IBM). This phenomenon is called *soft security* in the free software, open source and wiki communities.

Wikipedia is not owned by any individual or group. The content of Wikipedia is licensed under the GNU Free Document License (GFDL), the open content counterpart to the GNU General Public License (Stallman, 1991). On a fundamental level, participants edit on equal footing; however administrative roles are granted by peers to participants who exhibit competence, trustworthiness and dedication to the project (Meta-Wiki, "Power structure"). This system creates a bottom-up hierarchical structure based upon merit.

Successful open source communities develop hybrid political structures similar to both an open cathedral and a bazaar. Wikipedia Sysops are elected by the community and are able to delete pages and block users. Wikipedia Bureaucrats set Sysop privileges. Stewards are multi-project Bureaucrats. Board members are elected through a popular vote of active members and have jurisdiction over policy and project stewardship. This bottom-up hierarchical structure is similar to the structures created to administer module oversight in free software and open source code projects. It is noteworthy to mention that Wikipedia has various related wikis, some which support organizational and institutional needs and some

which are parallel or related projects.

Wikipedia founder Jimmy Wales is acknowledged by the community as the project's benevolent dictator. Like Linus Torvalds, he reserves the right to unilaterally make decisions. In practice, he rarely exercises this right (Meta-Wiki, "Power structure"). Benevolent dictators must keep the project alive while not becoming autocratic or infringing on the community-wide sense of project ownership.

Typically benevolent dictators are founders of the project and have put considerable energy into creating the initial version. Open source collaboration works well to iterate and grow a project, but originating a project using open source methods is difficult. Founders and early adopters are important in establishing the foundational mores of the community. Much of Wikipedia policy developed from Wales' desire to create "a world in which every single person on the planet is given free access to the sum of all human knowledge" (Meta-Wiki, "Foundation issues").

The benevolent dictator's power is held in check by the right to fork, guaranteed through the GFDL. All participants are volunteers and can leave the project at any time, taking the project with them if they chose. The Wikipedia platform and content database are available for download. As a consequence, a benevolent dictator only retains the position as long as he or she is trusted. Project forks can also occur when foundational attributes falter, fade, or no longer apply.



Black Rock City

For one week a year, Black Rock City exists in the Black Rock Desert of Nevada, a flat, dry, alkali lakebed which does not otherwise support life. During this week, Black Rock City is one of the largest cities in Nevada, with a population of over 35,000 in 2005. Black Rock City is home to Burning Man, a participatory social experiment in community and self-reliance off the grid.

Foundational cultural principles of Burning Man include valuing participation above spectatorship, self-reliance and the ecological principle of "leave no trace." Participants are self-managed and their participation is self-determined. Common contributions to the city include helping build and maintain city infrastructure, making art, providing a service or operating an establishment. Hurdles to participation parallel those of free and open source software projects. For those projects, a member must be able to code competently enough to participate. Black Rock citizens must be competent and responsible enough to survive in an exceptionally harsh desert environment. Black Rock City hosts occasional deaths. The entrance ticket reads, "You voluntarily assume the risk of serious injury or death by attending."

The streets of Black Rock City are laid every year in polar coordinates. The city has a Department of Public Works, a Department of Mutant Vehicles, public utilities such as road and sewage services, ice and coffee services, a fire department, a field hospital, a public art program, over twenty radio stations and an airport. A community group, the Black Rock Rangers, patrols the city to mediate disputes. Black Rock City has an official newspaper, *The Black Rock Gazette*, and an alternative newspaper, *Piss Clear*. In 2004, Black Rock City saw its first street protest over environmental resource usage.

No cash transactions are allowed in Black Rock City, with the exception of a café which serves coffee. Citizens engage in a gift economy. "Pay it forward" is a local ethos, although an underground barter economy is apparent as well.

The creation of and participation with art of all types is a central value of Black Rock City society. Louis Brill, in a *Leonardo* article entitled *The Art of Burning Man*, pointed out that Burning Man is "the largest outdoor art performance festival in North America....it has become an art incubator encouraging an exploration of creative expression against unique physical constraints and challenges of using a 20,000-year-old prehistoric lakebed as a blank canvas of artistic expression" (Brill, 2003).

At the helm of Black Rock City and Burning Man is founder Larry Harvey, the city and event's benevolent dictator. Harvey has described Burning Man as "a project dedicated to discovering those optimal forms of community which will produce human culture in the conditions of our post-modern mass society" (Harvey).

Why analyze Black Rock City and Burning Man through the framework of the free and open source software movements? Black Rock City is a society hack. In the spirit of the *hacker ethic* entry in the Jargon File, a glossary of hacker lingo dating back to 1975, Burning Man is exploratory "system-hacking" (Jargon File). As such, it exemplifies some traits of successful free software and open source movements, but fails to exemplify others. As mentioned above, using this framework to analyze Black Rock City and Burning Man may not tell the whole story of this community; regardless, lessons for collaborative community-building may emerge.

Black Rock City and Burning Man have the foundational fundamentals of a successful open source community:

- open and widespread membership based upon participation
- a compelling foundational artifact to organize participation and build upon
- a benevolent dictator
- foundational developers and early adopters who, along with the benevolent dictator, set project ethos.

While most cities evolve through a sedimentary process, Black Rock City is iterative. It exists temporally, after which the

city dissolves back into a geographically distributed populace communicating through cybernetworks such as tribe.net, e-mail mailing lists and Web sites. Considered through the wiki model, Black Rock City is the platform and Burning Man is the participatory layer. Coherent discussion and history layers have not been organized.

When analyzing Black Rock City and Burning Man through the framework of open source communities, we find some characteristics that do not correspond. Black Rock City and Burning Man are governed year-round by Black Rock City, LLC, a co-located staff operating as a traditional, top-down, opaque, hierarchical bureaucracy. Their operational model does not conform to the open source notions of transparency, open dialog, and peer review.

The traits of free software/open source communities considered here are often interrelated. Online open source communities must develop platforms to support project transparency, open dialog and peer-review in order to successfully communicate and collaborate. Asynchronous communication encourages collaborative, perpetually-clarified living documents, artifacts and project histories.

Distance is not necessarily a disadvantage for collaboration. Geographically distributed, networked collaboration can thwart the tendency for power centers to form around co-located members who then control the decision-making process, access to information and institutional history. Without structures developed through necessity by distributed open source communities, there are no mechanisms for collective institutional history, peer-review, debugging or project rollback to a stable state. A community-wide sense of project ownership becomes difficult to maintain as the project matures and the ranks of participants grow.

As mentioned above, successful free software and open source communities develop hybrid political structures to support participation and project development without the use of capital. Self-managing participants anarchically contribute according to their desires. One truism Eric Raymond developed in *The Cathedral and the Bazaar* is that "every good work of software starts by scratching a developer's personal itch." He explains:

...too often software developers spend their days grinding away for pay at programs they neither need nor love. But not in the Linux world – which may explain why the average quality of software originated in the Linux community is so high....the Linux community seemed to resemble a great babbling bazaar of differing agendas and approaches...out of which a coherent and stable system could seemingly emerge....(Raymond, 2000)

For a bazaar to function, however, an organizational and political structure must support it. Hybrid, flexible political systems based upon meritocracy motivate participants, provide rewards in the absence of capital, and encourage a community-wide sense of project ownership. In addition to the bottom-up, peer-administered hierarchy described in the analysis of Wikipedia, the benevolent dictator and consistently active personnel keep the project alive and dialog open from above, so to speak. Linus Torvalds was in a constant feedback loop with other Linux hackers. As Raymond points out, Torvalds kept hackers stimulated by the prospect of taking part in the project, and rewarded by the project's constant and relatively rapid evolution. The bazaar of open source communities gets most of the work done, but an open cathedral supports the community-wide social fabric by providing feedback for involvement, reasserting foundational mores, and keeping dialog active and open. A transparent meritocratic structure also allows for smooth succession in administrative and leadership positions.

In 2004, Burning Man experienced a crisis. The scale of the event increased enormously. Floods of new citizens, armed with superficial knowledge of the project and its foundational ideals, unskilled in the community's norms, stressed the project. Additional stresses included an increased presence of federal law enforcement, a feeling of under-appreciation among long-term volunteers, and a lack of enthusiasm for that year's public art projects. During such a crisis, the benevolent dictator can re-establish foundational principles and reweave the social fabric. The Black Rock City leadership, operating on a closed, top-down hierarchical model, focused on civic protocol.

The artists of Black Rock City, feeling the increase in authoritative control, the power of the established hierarchy, and a lack of involvement in the public art program, incited a revolution. They chose to fork. Their call to revolution occurred in the fall after Burning Man 2004, when Black Rock City had dissolved into the networks for another year. Two long-term, charismatic citizens, Jim Mason and Chicken John, founded the movement, circulating their manifestos and bluster through an e-mail list and an online petition addressed to Larry Harvey. A distributed community was networked through cyberspace.

Harvey upheld the right to fork. He granted the fork, named BORG2, the right to exist within Black Rock City. BORG2 configures their mission "to reaffirm the core truth of the larger Burning Man experiment: Collaborative creative work, broadly defined, is our main vehicle towards community." BORG2 consciously states that they intend to "work in the open source model" (BORG2).

Within the rubric of our analysis, the Burning Man community was unstable to the extent that it did not embrace the open source traits of project transparency and a supportive, meritocratic, hybrid political system. When the project was stressed, community-wide sense of project ownership eroded and was not resurrected by project founders. Foundational mores were not reasserted. Project ethos faded.



ThinkCycle is an open, Web-based collaborative platform for sustainable design projects. Initiated in 2000 by Massachusetts Institute of Technology (MIT) Media Lab doctoral students Ravi Pappu, Saul Griffith, Nitin Sawhney, Yael Macguire, Wendy Plesniak and Ben Vigoda. ThinkCycle seeks to support “distributed collaboration toward design challenges facing underserved communities and the environment” and to create “a culture of open source design innovation” (ThinkCycle, “About ThinkCycle”). Completed projects include a novel, inexpensive cholera treatment device, a passive incubator for premature infants, bio-sand and ceramic household water filters, and a low cost eyewear micro-manufacturing system.

Cofounder Nitin Sawhney cites the Appropriate Technology Movement of the 1970's as influential to the foundational mores of ThinkCycle. This movement emphasizes design within a social, economic and political context. It promotes the social and moral responsibilities of designers and considers the protection of socially valuable ideas to be unethical (Sawhney, 2003). Sawhney cites three trends which emerged in the 1990's which were critical to the creation of ThinkCycle: distributed computing and online communities, global dialog on the digital divide and sustainable development, and intellectual and public domain movements such as the open source movement.

The ThinkCycle process begins with members contributing a design challenge within the domain of sustainable design, underserved communities and the environment. ThinkCycle also solicits design problems from non-governmental organizations and other stakeholders. These challenges are peer-reviewed by domain experts and made available to designers through ThinkCycle. The design processes which unfold on ThinkCycle are transparent and anyone is welcome to register and post ideas, critiques, suggestions and drawings of their own proposed solutions. Domain experts are able to give project advice and help with resources.

Each design challenge has a wiki-like area with sections for discussion, shared team spaces, an open digital publication repository and project archives. ThinkCycle, like Wikipedia, reserves a separate space for discussion. Recognizing that these discussion areas often serve as a forum for free-flow, and at times emotional, dialog, this space is call Soapbox and members are invited to post “rants” here.

ThinkCycle has attributes of an open source community: open dialog, peer review, collaborative, iteratively-clarified artifacts, and foundational developers setting project ethos. ThinkCycle supports to the right to fork by developing open source collaborative problem-solving and design software. On the other hand, while ThinkCycle's Web-based system has a robust organizational structure, there is a lack of political structure to support the bazaar. ThinkCycle is currently facing the lack of a heavily invested, heavily involved benevolent dictator. ThinkCycle was formed by a group of MIT students who are leaving or have left MIT and the project (ThinkCycle, “Topic: ThinkCycle.org: Creating a Sustainable Non-Profit”). The result of open participation without political structure is a lack of peer oversight supporting the collaborative process. This lack of oversight in turn results in a lack of focus in posts and some schlock. Also, membership in ThinkCycle is not dependent on project participation. Anyone is welcome to register and post comments and ideas. This practice exacerbates the lack of focus through off-topic and outlandish remarks.

Another challenge which hinders ThinkCycle's development stems from the co-location of many of its contributors. Because ThinkCycle originated as an MIT project, it was used most by MIT design teams. Because team members were co-located, the projects were developed in real space and then recorded retroactively on ThinkCycle out of obligation. In these cases, participants saw ThinkCycle as a time-waster. They felt they were duplicating their efforts by using the system (Sawhney, 2003).

ThinkCycle would benefit through a political structure that supports peer review, successor benevolent dictators, making participation a condition of membership, and encouraging participation through a more geographically dispersed area.



Conclusion

The free software and open source collaborative models represent an alternative approach to collaborative development that has evolved along with network technologies. Because the free software and open source communities collaborated under historically novel circumstances, they discovered novel collaboration methodologies. These methodologies need not be limited to software development, especially given the distributed, networked nature of contemporary society. Lessons for collaborative communities learned from this analysis of three non-hacker, collaborative communities are summarized as follows.


The benevolent dictator and early project adopters create an essential social fabric by establishing and asserting project mores, protocol and ethos. A lack of assertion of these mores, protocol and ethos at crucial time during the evolution of the community can lead to instability, as in the case of Black Rock City. Relative absence of these figures can lead to lack of project robustness, as in the case of ThinkCycle.

Hybrid political systems consisting of anarchy, dictatorship and meritocratic bureaucracy support the project when the political system is transparent and the dictator is trusted. Wikipedia is particularly successful in this respect.

Project transparency, particularly open, recorded dialog and peer review of project materials, discussion and decisions lead to trust among members, a recorded institutional history and efficient debugging. The institutional history can serve to revert project to a stable state, inform members of decisions, and help members understand the rationale behind decisions. Again, Wikipedia is particularly successful in this respect.

A community-wide sense of project ownership and a reward system can replace capital in collaborative projects. This sense of ownership rewards participants for their personal investment and in some cases contributes to their identity.

An asynchronous, geographically distributed membership coordinated through an effective platform facilitates transparency and project metalayers such as recorded histories and discussions. It also thwarts the tendency for opaque co-located power centers to develop, as in the case of Black Rock City, or the platform to become an archive, as in the case of ThinkCycle.

Members should be active participants, otherwise focus can be lost. Also, discussion about the project should not infect project content. These layers should be separate, but related. 

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Note

1. Manuel Castells, 1998. *The Information Age: Economy, Society and Culture*, volume 3, p. 340.

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