I, Alec J Gardner, hereby submit this original work as part of the requirements for the degree of Master of Architecture in Architecture (Master of).

It is entitled:
The Architecture of Mass Collaboration: How Open Source Commoning Will Change Everything

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THE ARCHITECTURE OF MASS COLLABORATION:

How Open Source Commoning Will Change Everything

ALEC GARDNER/UC_DAAP SAID/SPRING 2013
The privatization of tools, the specialization of knowledge, and the restriction of access to technological systems have progressively removed the amateur from the design of the built environment. Today, maker culture and the open source movement offers an alternative approach. This approach invites the public into a new sphere where access to open information systems and shared, affordable, user-friendly technology renders the specialist obsolete. In doing so, these post-industrial movements transfer authority and tools to the commons, and offer a growing library of free, downloadable blueprints with an enormous supporting network of opinions, advice, and training. Technology and the Internet are quickly erasing the division between the professional and the amateur. Presently architecture fails to address this and it is ill-prepared for this confrontation. The following thesis surveys the current situation through relevant literature reviews, current technological applications, and applied analogies to other fields which are offered to better address the lack of architectural research on this subject. This thesis is grounded in the theoretical framework of the open source movement and it situates itself to answer the following questions: How can architects compete in a networked information system that allows downloadable manufacturing kits to produce open designs? How can architecture be crowd-sourced and made more open to perform for and from the commons? What lessons can be learned from other fields that have adopted an open source methodology and process for their work? What are current examples of this transition, and how can the architect be relevant in a globally networked information society?

To address these questions, this thesis presents research on the early development of open source software and its rejection of hierarchical organization. It reveals its successes, its supporting legislation, and its widespread use in computer science and governmental policy. From this historical background it analyzes the advent of commons-based peer production, and explores how masses are openly collaborating to drive innovation and growth in society. It investigates how online networks are transplanting the open source ethos offline, and – through product service systems, redistribution markets and collaborative lifestyles – are transforming the consumer into an engaged participant. It tracks the beginnings of maker culture and its direct connection to DIY and vernacular lineages in architectural history. It examines how open source software has led to open source hardware further erasing digital and physical constraints. Several case studies of downloadable manufacturing tools and design platforms are presented, as well as precedents of relevant architectural methods and how they are attempting to address this cultural shift. Finally, it provides an introduction into the built studio project, the design manifestation of this research document. This thesis is, in itself, an amalgamation of existing technologies and precedents and remains a work in process, existing in order to situate itself into future negotiations of ways of doing architecture.
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THE ARCHITECTURE OF MASS COLLABORATION:

How Open Source Commoning Will Change Everything
“Architecture is too important to be left to architects.”
Giancarlo de Carlo

A man awakens from an 80-year dream to find that sleep has never really come. He finds himself in a new city, and all appears different yet is in fact the same. “Beneath the veneer of the new is an all too familiar world.” He explores his new environment to find it a stale pastiche, and as he wanders through the city he begins feeling excruciating pains that he cannot identify. It hurts when he exhales; it hurts when he relieves himself; and, when laying in bed his body searches to find a position without pain. He is too shy and embarrassed to consult others, and too poor and unsettled to visit a physician. He walks and then stops for a drink of water. He finds food at the public market and then he stretches his legs in the downtown streets. He smiles at the site of the sun piercing through the leaves and warming his face. He bends to pick up a crumpled note turning soft from the moisture of the morning. The dietary adjustment and changes he has made in his physical activity only increase his awareness of his own discomfort. He finds his way into the public library and sits at a computer desk, under the bright humming lights hanging from a dropped ceiling structure. A homeless man sits next to him with his duffel bag full of possessions. His face and hair are wet from his bath in the public restroom. They both log into the machines in front of them.

His hands and eyes work in conjunction and are directed toward a browser on the desktop. He searches the online network using his symptoms as keyword phrases. He immediately receives search results, and effortlessly opens them to explore their content. Shortly he discovers testimonials with people suffering from the same ailments. He finds a user from Philadelphia, another from Lisbon, and another from Beijing describing their symptoms consistent to his recent experiences. He begins to further customize his search phrases using the new keywords he has discovered while reading their posts. He continues to filter out the most viable results through the most popular websites. He stumbles upon a public forum where physicians review questions and reply to people’s inquiries. He studies them. He arrives at the conclusion that the diagnoses for an anonymous user, months prior, is the closest match to his own. He gathers that an antibiotic treatment will cure his condition within a few days.

Without the resources and familiarity to physically visit a doctor’s office he logs into the site and creates an anonymous profile that puts him in direct contact with a licensed physician and posts a message with his specific symptoms, their frequency, and detailed triggers. A pain returns and he cowers in front of the computer. Within minutes he receives a reply from a doctor in India confirming his infection, prescribing an appropriate treatment. He searches for a free medical clinic in Seattle. He reads through user reviews and sends an online message scheduling for an appointment and consultation later that day. He decides to log out of the computer network and drift into the public library.

The library is enormous, static, and fragmented. Its organization is unapproachable. Its resources on display are concealed and unwelcoming. It is a familiar institution and though it shows a new material approach to a civic monument it is mere appearance. It is an architecture without substance. The quality and scope of the building shows an architecture immune to transformation and progress. It tells of an architect of a single mind, not connected to this new collective intelligence he has just discovered.

He returns to the third floor of the library and logs in to the computer and is greeted with a reply from the clinic’s receptionist. He leaves the library with a confirmed appointment scheduled for later that day. He walks outside and the mist has become a trickle. The sounds of the passing cars are followed with subtle splashes under their wheel wells. The trees of radiant green are projecting on to the grey backdrop. Everything around him feels clean and slowed. But in its apparent suspended motion, the city is buzzing, like a running river around a stable boulder. His thinking is disrupted as he is struck by a pedestrian on a smart phone briskly dodging...
the weather on her way to the nearest bus stop. He follows her and asks her the address for his afternoon appointment. She doesn’t know but offers her mobile phone service as a navigator. With its help he is given directions along with travel times and waits at the nearest bus stop. A monitor waits next to him displaying the location of the next bus, and gives him an estimated time of four minutes before it will arrive.

The bus pulls to the curb with bicycles mounted on a hydraulic frame suspended in front of it. The driver opens the doors and the passengers who are riding in the zone enter for free, and the others use a computer at the entry to magnetically read their electronic card. He stands in a crowded bus. The water gathers on the floor near his feet. A couple next to him is having a conversation about their lunch at the new Korean Bistro down the corner. A man brushes shoulders with him, as both their hands are hanging from the straps above. He makes eye contact with the man and the man nods and returns his head back to the small screen in his hands. He asks a question about the bus routes to a young woman behind him and the teen removes her earpiece and joins the conversation.

He arrives at his destination and enters to visit the physician. The office is drab and asleep, muffled by its own history, so present in his heightened awareness. He waits with others dabling on their phones, and stares at the television above the receptionist’s desk. The screen flashes with local news and advertisements of events and products asking for his opinion, asking for him to comment, to like, to tag, to edit and to participate in a new collaborative culture of shared knowledge and common interest. He rests still in his chair, his hands on his knees, and a quiver of pain sits next to him. His name is called, and he is ushered into the back. Past the lobby, through the fluorescent white hall he endures the invasive and painful tests that confirm his diagnosis.

He returns to the waiting room, and sits near the window. He begins seeing the world not as a reduction of its parts, but as a thriving whole, as one great reconciliation of all varying constituents. It becomes clear to him that everything plays a germinable role in a natural phenomenon; that A + B is no longer C; that 2 + 2 was never 4. He knows now that 2 + 2 can equal anything and everything, that C Major is not the composition of the notes C, E and G, but how the parts relate and transform into a harmonic chord. He stops and turns to the man across from him and says: “the emergent step though it may seem more or less saltatory, is best regarded as a qualitative change of direction, [a] critical turning-point in the course of events.”

The nurse returns with a prescription and he walks to the pharmacy distributor attached to the hallway outside the waiting room. He is asked to pay $9.75 for the 22 pills. He leaves the office feeling cheapened by the end result of the complex processes that brought him here. The accessible technical sophistication that was at his fingertips; that had guided him from his pain to this prescription had resulted in plain product, a piece of paper with a signature, and money for materials. The service was detached from the product. It was outside the office, outside the institution. It was what had informed him, and what had brought him there. In the city he was more than a consumer, and much more than a customer; he was an end-user and he was a “wrangler” negotiating with others the terms of his own circumstance.

Outside the rain has stopped, and he walks down the sidewalk under the storefront awnings dripping their last drops of rain. Wasps emerge from a hive tucked under a mullion, and as they hover and buzz past him he sees that “no one is in control, yet an invisible hand governs, a hand that emerges from every dumb member.” The architect awakes.

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THE ARCHITECTURE OF MASS COLLABORATION:

How Open Source Commoning Will Change Everything
The history of open source software has any number of origins. If one starts where a computer scientist would then its history begins with the scientific method: a rational Descartian approach to truth through discovery and justification. The ability to reproduce experiments and confirm results are only possible in a shared community of knowledge. The hypothesis, and the testing conditions must be made available and the methods made transparent to be tested again by others. Peers must be able to stand on each other’s shoulders to see further, to prove, disprove, edit and refine the process and methods, and to share their findings. Peer review and consensus is paramount in scientific inquiry. If one looks for a source as an historian would, then a thread can be traced even further to the origin of civilizations and the importance of communication, calculation, and standardization within societies. Early social groups shared methods and procedures for tools, home building, and agricultural techniques. They passed on stories and recipes for medicine and cooking hoping to ensure predictable results in an unpredictable environment. Like James Burke, a historian could see an infinite web of connections throughout history that led to the culmination of cultures and events that would eventually produce and consider something “open source.” But it could not be considered “open source” until there was something “closed source.” Evolution’s reactionary nature makes timing everything.

The history of open source software is woven together from the start with the history of the Internet. The ARPANET, the ancestor of today’s Internet, and computer software programming were all products of the United State’s need for global telecommunication and military technological dominance after World War II. The original memoranda calling for the creation of the ARPANET is encased in a culture of sci-fi imagination. It is rife with implications of the space race; of fears of weapons of mass destruction and apocalyptic ends; of reactionary dreams of peaceful future space agencies exploring new lands and boldly going “where no man has gone before.” Its history is rooted in a group of enthusiasts, and tinkerers; problem-solvers that proudly called themselves hackers. The early hackers were amateur radio hobbyists, and stargazers, wearing white socks, and thick black frame glasses, convinced that science had all the answers. They were trained as engineers and physicists, and they were the future of Cold War America and its push toward global supremacy. It was this “hacker ethos” that built the Internet, Unix, the World Wide Web, and that built computer language scripts, laying the foundation of open-source software platforms thirty years before it was coined.

The original paper that described the concept of the Internet and began the investment and research into the ARPANET was written in 1962 and entitled:
“Intergalactic Computer Network.” In the fervor of post-war success, the exaggerated fear and imagination of human control over the environment, and the vast inflation of governmental budgets, the U.S. Department of Defense invested heavily in research projects for improving quality and precision in computing and satellite communication. In the same year that ARPA was finding its feet, the inventors of Unix and C language were emerging from the corporate world of Bell Laboratories then controlled by AT&T. Ken Thompson and Dennis Ritchie were inventing new computing languages and new operating systems to increase compatibility and capability of varying proprietary parts. As one research experiment led to another, the team continuously chose to maintain and prioritize “collaboration” and “usability” over all else. Ritchie observes: “What we wanted to preserve was not just a good environment in which to do programming, but a system around which a fellowship could form [moreover] we knew from experience that the essence of communal computing, as supplied by remote-access, time shared machines, is not just to type programs into a terminal instead of a keypunch, but to encourage close communication.” Thus the critical element mirrored in both the development of ARPANET infrastructure networks and the bones beneath the operating system was the recognition that computers were not going to be seen as logic devices, but as nuclei of communities and “fellowships.” It was the ARPANET that brought together a community of hackers in a critical mass, and it was there where they discovered each other and reinvented themselves as a “network tribe.”

By 1972, an early open source and non-proprietary software called Unix was the operating system for Bell Labs and GE, and it had become the standard system for document-formatting, typesetting, and communication tools in a growing number of large corporate offices and government branches. Given the widespread use,
The unconscious birth of open source tools.

The first personal computer, screen sold separately: 1975

collaboration between programmers flourished: “Professional rivalry and protection of turf were practically unknown: so many good things were happening that nobody needed to be proprietary about innovations.” In 1974, Unix was made available to the public, because AT&T had a vague licensing domain over the operating system as it was not legally considered telephone technology. Research labs and universities rushed for access, and Ken Thompson himself packaged and shipped out disks all over the world, with his signature and a note that said, “Love, Ken.” By the late 1970s, the University of Toronto, Yale, Harvard, Rutgers, Carnegie-Mellon, Purdue, University of California at Berkeley, USC, UCLA, MIT, and Stanford to list a few were using, modifying and redistributing code. The theater of innovation moved from the industrial and government laboratories to academia and on to a growing number of commercial platforms. Unix and its rampant increase in use had created a bigger network and pool for collaboration than ARPANET, which had been purely a government tool. But any collaboration and work was not yet able to be shared through ARPANET, so floppy disks and hard copies were mailed out internationally, connecting universities with the same operating programs.

By 1975 personal computers were appearing on the market for the first time, and in 1976 Apple Computer, Inc was founded by Steve Jobs, Steve Wozniak, and Ronald Wayne, but the price tag kept only exclusive parties involved. In 1981 the milieu continued to dramatically changed direction as IBM sided with Microsoft, thus creating a rigid monopoly on desktop computing software and setting a tone for proprietary software services and their link to a new market for computer amateurs. In 1983 AT&T split with Bell Labs and won an antitrust case and moved forward to commercialize the Unix operating system fully. Eric S. Raymond, programmer, author, and seminal figure in the open source movement, argues that AT&T’s move to make Unix a copyrighted product “destroyed the free exchanges of source code [and] knowing no other model than secrecy for collecting profits from software and no other model than centralized control for developing a commercial product, AT&T [voided all] source code distribution.” This had two significant effects.

First, participation from collaborating universities ended, as the threat of lawsuits overshadowed the risks of participation. Second, cross-platform compatibility decreased as companies in the new Unix market sought product differentiation to increase their market sales. It was this event that caused the cultural reaction that would go on to define open source. It was during this time that Richard Stallman introduced free software and published his GNU manifesto, in the face of a “closed source” reaction.

Stallman, in an attempt to divert software coding and sharing from being controlled by profitability and proprietary distribution, launched the GNU project: a social, ethical, and political initiative, stemming from his frustrations at MIT’s Artificial Intelligence Lab. The ARPANET handbook in 1982 was written specifically for government use and all liated universities. Using its tools for private use was forbidden and “sending electronic mail over the ARPANET for commercial profit or political purposes is both anti-social and illegal [and] by sending such messages […] it
is possible to get MIT in serious trouble with the Government agencies which manage the ARPANET. By 1984 the computer world was moving to the minicomputer and workstation. The desktop would soon flourish, and the beginnings of the Ethernet had taken hold. It was enormous tech companies and conglomerates that were corporitizing everything and government regulations moved to reinforce secrecy, privacy and control. Stallman demanded something different. He wrote a copy of Unix, entirely written in C language, and made it available for free. Being seen as the leader of the hacker movement, he published his GNU manifesto in 1985 in *Dr. Dobb’s Journal of Software Tools*. Though it is somewhat obscured with its technical output, Stallman calls for a fundamental shift in computer science. He reminds the reader that it must always be shared and made public in order to further innovation and scientific knowledge in the field. Furthermore, it must be restructured in order to decrease commercialization.

I consider that the Golden Rule requires that if I like a program I must share it with other people who like it. Software sellers want to divide the users and conquer them, making each user agree not to share with others. I refuse to break solidarity with other users in this way. I cannot in good conscience sign a nondisclosure agreement or a software license agreement. […] I could not remain in an institution where such things are done for me against my will. So that I can continue to use computers without dishonor, I have decided to put together a sufficient body of free software so that I will be able to get along without any software that is not free.

In the GNU Manifesto Stallman forecasts the days of piracy software to come, writing, “the fundamental act of friendship among programmers is the sharing of programs; marketing arrangements now typically used essentially forbid programmers to treat others as friends. The purchaser of software must choose between friendship and obeying the law.” He says that the benefits of working with GNU rather than proprietary programs, are that one can be “hospitable to everyone and obey the law.” Recalling Ivan Illich’s *Tools for Conviviality*, Stallman “invert[s] the present deep structure of tools” in order to “give people tools that guarantee their right to work with independent efficacy.” Stallman calls for a new moral order in social knowledge and tooling, one where good software systems are free and available to all; where wasteful duplication of system programming efforts are avoided; where users have a choice and are not at the mercy of one programmer or company; where system sources are available so that users have the right to run the program, to study how it works and adapt it to their own needs, to redistribute copies to others, and to improve the program and share their improvements with the community so that all benefit.

Stallman’s GNU manifesto for a free software movement, would be adopted and furthered in the open source software movement organized ten years later. Stallman’s essay was a neo-liberal political stance calling for an equal distribution of power against a burgeoning effort to commodify computer code. It was a social effort to empower users and to take advantage of the fundamental difference between
software and hardware: ease of reproduction and customization. In 1989, Stallman wrote the first version of a free software copyleft license known as the General Public License (GPL). These licenses ensured that equal distribution and freedom are preserved, and that no additional modification or edit can result in a proprietary version of the software. The importance of the GPL is that it provides programmers assurance that their work will remain free and accessible and provide a “social good,” rather than being exploited by software companies. These licenses proved to be crucial to the success of Linux and its community of programmers and developers in the years to come.

By 1991, Unix and the GNU community would be dramatically altered when Linus Torvalds, a university student from Finland, introduced the Linux project. Similarly to Stallman, Linus was reacting to the proprietary, high cost of Sun’s Unix system at his university, and he engineered a tool to divert its expense. His operating system kernel made it possible to host pre-existing GNU software, ultimately combining twenty years of code into an easily usable interface. In addition, his system allowed for easy upgrades, which had been the primary complication in the previous twenty years as advancing technologies forced their predecessors to be increasingly obsolete. As it developed, the most important feature of Linux was its sociological and economic effects. Linux proved that an extremely complex operating system could be developed and carefully coordinated not by a small, close-knit group of professionals, but by a large, widespread group of enthusiasts and reactionary volunteers delicately connected by the beginnings of the Internet and the World Wide Web. Raymond writes, “quality was maintained not by rigid standards or autocracy but by the naively simple strategy of releasing [modifications] every week and getting feedback from hundreds of users ... [thereby] creating a sort of rapid Darwinian selection on the mutations introduced by developers.”

With the birth of the official World Wide Web in the same year, Linux adopted Stallman’s GNU GPL, and let free use and ease of distribution decide its future.

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**From: torvalds@klaava.Helsinki.FI (Linus Benedict Torvalds)**

**Subject: What would you like to see most in minix?**

**Newsgroups:** comp.os.minix

**Summary:** small poll for my new operating system

**Message-ID:**

**Date:** 25 Aug 91 20:57:08 GMT

**Organization:** University of Helsinki

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Hello everybody out there using minix -

I’m doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I’ll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

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In 1997, a group from the free software community organized in California. Their primary goal was to restructure and re-brand the Free Software Foundation, in order to promote and further the participation and interest in the field from those that were shunning its anti-business message. Eric S. Raymond spearheaded the campaign, and the result took the name of Open Source. Their efforts would ultimately become a new business model for collaboration that would appeal even to Microsoft, and IBM and with the popularity of sites like Wikipedia in the years to come, an entirely new culture would rise to adopt its ethos. Two years later Raymond authored the seminal text on the subject: *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*. The text presents a history of computer ‘hackerdom,’ and a diary of Raymond’s open source project, fetchmail. In it, he examines the relationship between top-down and bottom-up design, and provides psychological under-pinnings for its success, economic incentives, and business models for open source software’s future. Moreover, his book is an attempt to appeal to those who disregarded the Free Software Foundation as a utopian, socialist declaration of anti-business, by providing guidelines for how to create good open source software and proposes business models and alternative views on how open source software should be utilized in a profession that was dominated by proprietary software. In the beginning he admits doubts that Linux would work:

> Linux overturned much of what I thought I knew. I had been preaching the Unix gospel of small tools, rapid prototyping, and evolutionary programming … But I also believed there was a certain critical complexity above which a more centralized, a priori approach was required. I believed that the most important software needed to be built like cathedrals, carefully crafted by individual wizards or small bands of mages working in splendid isolation, with no beta to be released before its time.  

Linux and its success thus came as a surprise, and Raymond describes its development in contrast to the centralized cathedral approach, referring to it as a “great babbling bazaar of different agendas and approaches.” Although he does not go into great detail with this analogy, the message is clear, and the metaphor strong. He sees top down design approaches as a cathedral: a unified, monolith – one that is carefully designed and executed and that does not allow for adaptation or flexibility. He sees bottom up design as a bazaar: a public open-air market, comprising a piecemeal collection of functions that shift uses and evolve and comprise a whole only by its changing parts. Linus’ style of design and program development supports the bazaar model because its flexibility and transparency are apparent by making public early and often all modification. It delegates as much of the design work as possible to anyone willing and able. It is available and free to use to a point of promiscuity, and Raymond sees this initially as a vulnerable system. Raymond writes that Linux disproves the Fred Brooks’ law that governed software development since its publishing in 1975: “Complexity and communication costs of a project rise with the square of the number of developers, while work done only rises linearly.” In other words the more programmers you add to a late project postpones the project further.
The explanation for this rule is that it takes time and resources for new members to acclimate to the process of the work group. It takes time for new members to be productive in the methods in which the project is being developed and it takes the production away from those that are educating and informing the new member. Brooks’ Law states that new members are likely to contribute negatively as they introduce new “bugs” into the project, postponing its completion. Furthermore, a larger group of participants creates more tasks that need to be managed and synched with the work of others, thus increasing communication overheads. However this law is broken in Linux, in fact if this law’s assumptions were true, then Linux and open source would be impossible.

The hierarchy and structure of top down organization in Brooks’ model is what creates the context and rules for which it can be broken. In his model there are deadlines, there are assumed finite stages of completion, there is a hierarchy of communication, a division of labor, and specialization in tasks. These roles must be appointed and the structure allows for little flexibility because very little is synchronous and even less is independent. In addition, each member is aware of their position, and their delegated task, and work within that structure. When stages are finished then waiting time is inherent, as other parts must be completed and integrated before the next can begin. In Linus’s Law none of these restrictions are present. First, enthusiasts and volunteers personally discover the problems and do the work to solve them. In addition they are more familiar with the program because they are using the program they are designing. This way every “bug” becomes visible as each member discovers it during their use. The users see their improvements and problem solving in real time, and their modifications are updated and available to all other users for comments and peer review. As Raymond puts it, Linus’ Law is driven on the fact that “given enough eyeballs, all bugs are shallow.”18 Which is to say that with enough users, all the problems will be noticed and addressed. This large group of “beta-testers” enforces thoroughness and is another unique feature in Linux that disproves Brooks’ Law. Each user is a beta-tester. Each user is a co-developer, increasing the likelihood of problem finding. In the bazaar model the programmer “loses the distinction of ‘developer’ and becomes a ‘co-developer,’ dissolving the categorical distinction between those who code, and those for whom there is a code.”19

In Linux and open source platforms, it is more important to find a problem, then to be able to fix it, because within the group of enthusiasts someone will understand the problem and be able to address it, in less time and cost then it would take someone in Brooks’ model. Finding and fixing problems happens more rapidly in Linux than any other system, and this principle has dramatically shaped the Internet and a new culture fascinated with peer review, crowd-sourcing and collaborative consumption. It is the fundamental principle that helps Raymond describe his cathedral and bazaar analogy. He writes, “In the cathedral-builder view of programming, bugs and development problems are tricky, insidious, deep phenomenon. It takes months of scrutiny by a dedicated few to develop confidence
that you’ve wrinkled them all out. Thus the long release intervals, and the inevitable
disappointment when long-awaited releases are not perfect.”20 Linus’s law and the
bazaar model for Raymond assume that the problems discovered are “shallow” in
comparison, because each problem becomes immediately exposed to a network
of eager co-developers. The more frequently you release, the more attention you
draw and the larger the community grows. The larger the community, the more
problems are addressed and expectation are kept low on each release, but grow higher
in the long term process. This process increases participation and reveals greater
transparency which furthers the excitement of the users. It shows certain sociological
similarities to the Delphi Effect, which is imbedded in the new culture of the Internet.
The Delphi Effect states that an average group of users is a more reliable prediction
than an opinion from a single randomly chosen observer. The Linux user, is a self-
appointed problem solver, and an equal voice in the evolution of a software based on
peer support, popular consensus, and the move toward commoning.

Raymond conveys many critical points to a procedure that ensures an
open source model for programming development. His intention is to show that
any developer who uses the cathedral style of building is going to fall behind
the developer who uses the bazaar model. Those who “[know] how to create an
open, evolutionary context in which feedback exploring the design space, code
contributions, bug-spotting, and other improvements come from [thousands] of people” will excel at staggering rates.21 Raymond sees open-source as a natural
ecology, an evolution where those quicker to adapt will succeed, and those that
succeed will search for balance in a self-correcting system that produces its own order.
From this an efficiency and organization naturally arises to an order that is more
complex, efficient, and prolific than anything that could be centralized. Raymond
writes, “in the end the open-source culture will triumph not because cooperation
is morally right, or software ‘hoarding’ is morally wrong ... but simply because
the closed-source world cannot win an evolutionary arms race with open-source
communities that can put order of magnitude more skilled time into a problem.”22

The primary differences between open source and the freeware of GNU,
is the vagueness when combining proprietary and open source software. Open
Source licenses allow for the use and redistribution of the software without financial
compensation or credit to authorship, meaning that you can borrow source code
from one program and add it to that of another without notifying either party.
You could then package and sell your service or product without paying royalty or
acknowledging the source of your software code. The reasons for programmers and
developers to use such a system of shared resources is unanimously upheld as a better
way to improve their science and level the playing field. It is not altruistic motives
that guide the generation of programmers who learned computer science under the
influence of GNU, it is the pure fact that working with better code, improves their
work, and expands their knowledge. It may come as a surprise that programmers
and software developers are working on projects that they give away for free, but it
calls into question the notion of commodity, product and service when materials and

20 Raymond, Eric S.. The Cathedral and the Bazaar: Musings on Linux and Open Source by an Acciden-

21 Ibid, p. 51.

22 Ibid, p. 54.
resources are abundant. Open source software companies have developed extremely lucrative and thriving business models that stress the importance of service providers. Steve Weber, professor at UC Berkeley writes, “open source code does not obliterate profit, capitalism, or intellectual property rights. Companies and individuals are creating intellectual products and making money from open source software code, while inventing new business models and notions about property along the way.”

They give away products, they provide convenient manuals, and they create an entity that people trust. It is the transparency and peer support that becomes its selling point. In many cases open source software companies will charge a distribution cost, or a convenience cost, allowing you to download their programs at a higher cost then them burning it to a CD and mailing it to you. This division in cost reflects the expense to host and maintain domains and servers, only paying to cover the overhead to run the equipment. In this model you pay for a service convenience even though the product is free. As Raymond sees it, it is like giving away a recipe and opening a restaurant, people can make it themselves, but sometimes you don’t want to cook, or have the time. This idea has influenced Apple, Android, and Google’s App stores, where you are offered to install a free app that may support advertising or may be last year’s development codes, but then after paying a small fee you receive the newest source code and the removal of supported ads. This model can also be seen as see the software, sell the content or see the software, sell the brand. All of Google’s apps are developed as open source software, and the vast majority of Apple’s are licensed similarly. In addition, what companies like Apple and Google are selling is an investment into their future. By creating a market of free applications, a larger group of users will be attracted, and the larger the loyal market that follows. Their idea could be restated as, see the present, sell the future. Even though it is free for a user to download and use an app, and it is free for them to comment and make reviews on its future improvements, what Apple and Google are getting instead of money, is time and loyalty, and a growing audience of informed users that could emerge as problem-finders, peer reviewers, and a purchasing market, that if treated as the most valuable asset, will become the most valuable asset.

Apple and Microsoft have spent an incalculable amount of man-hours, dollars in development, and employee costs. Linux has cunningly avoided that structure. Linux was conceived long after Apple and Microsoft began their developments, nevertheless today it is considered a more trusted and competitive alternative, doing much more with much less. It is surprising considering the beginnings of open source software, that it is not confined to small niches of hobbyists working in the outskirts of a mainstream information technology economy, but rather it dominates the techno-marketplace. Linux is the tool that is operating the vast majority of our new technologies, and it is embedded all around us. Sixty-five percent of all active web sites use the open source web server Apache. Linux is used as the operating system for more than a third of all web servers, and free open source browsers like Mozilla Firefox and Google Chrome account for forty percent of total market shares. Linux, within Android, is running forty percent of all smart phones in the United States, and

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over seventy-five percent worldwide.27

Countries and cities are recognizing the “significant political, economic, and sociological ramifications of the large-scale adoption of software engineered by the [hierarchical] strategies of closed-source software developers.”28 In 2000, the President’s Information Technical Advisory Committee recommended that the federal government “support open source software as a strategic national choice to the U.S. lead in critical software development.”29 In an attempt to divert costs and improve efficiencies, it is now used by the U.S. Department of Defense, the U.S. Navy Submarine Fleet, the U.S. Army, the Federal Aviation Administration, the U.S. Postal Service, U.S. Federal Courts, the U.S. Department of Energy, and the New York and London Stock Exchange. Government legislation all over the world is resisting the Microsoft monopoly and forcing government agencies to use open-source and free software. The City of Munich, the Municipal Government of Mexico City, the French Parliament, the National Government of the People’s Republic of China, the governments of Turkey, South Africa, Spain, Cuba, Pakistan, Macedonia, The Philippines, Malaysia, Iceland, Peru, and Brazil. In addition, all academic and educational institutions from the following countries are mandated to use Linux: Russia, Germany, Philippines, Georgia, India, Switzerland, and Italy.

Today it is hard to find a Fortune 500 company with an IT department that does not depend on open source software. Nearly forty percent of large American companies use Linux, including McDonalds, Yahoo, Garmin, Pixar, Disney, Dreamworks, Reuters, Merrill Lynch, E*Trade, Novell, Google, IBM, Oracle, Panasonic, Sony, Virgin America, Cisco, ConocoPhillips, Amazon, Peugeot, BMW, and Toyota. Linux is running the world around us, and it is running the world in our fingertips: our cable boxes, our TiVo, our satellite radios, our GPS devices, our DishNetwork, our Sony Playstation 3, and our Netbooks.30 Linux has also proven itself to be completely scalable. Just as it operates hand held devices, it also operates the most advanced computers on the planet, running CERN, and 85 percent of the top 100 supercomputers in the world.31

Even though Linux is running few personal computers, it is running the companies that produced, and shipped our computers, and that track and support the vast majority of all that it will ever do. Lawrence Lessig, Law professor at Harvard states in Code and Other Laws of Cyberspace that “open code is a foundation to an open society.”

We live life in real space, subject to the effects of code. We life ordinary lives, subject to the effects of code. We live social and political lives, subject to the effects of code. Code regulates all these aspects of our lives, more pervasively over time than any other regulator in our life. Should we remain passive about this regulator? Should we let it affect us without doing anything in return?32
In 2002, Yochai Benkler, Law professor at Harvard, and Yale, wrote the seminal paper on Internet social production, entitled “Coase’s Penguin, or Linux and The Nature of the Firm.” The text presents a three-part discussion regarding the emerging phenomenon of open source software as a surprising new model of production because it “should not be there, at least according to our most widely held beliefs about economic behavior.” Benkler explains how a group of volunteers without monetary incentive was able to “beat the largest and best-financed business enterprises in the world at their own game.” He starts by identifying that they are playing by new rules, that avoid markets and managerial hierarchies of organizing production, and avoid all transaction costs. He identifies two major advantages for commons-based peer production over firms and market economies. First, “it places the point of decision about assigning any given person to any given set of resources with the individual” and it provides a framework where “individuals who have the best information available about their own fit or a task can self-identify for the task.” When this self-selection is combined with peer reviewing and statistical analysis it proves to be the most efficient system for information gain, one that firms and markets cannot compete with. Second, is the ability to allocate human creativity. Benkler writes: “Peer production has an advantage over firms and markets because it allows larger groups of individuals to scour larger groups of resources in search of materials, projects, collaborations, and combinations than is possible for firms or individuals who function in markets.” In addition, as ubiquitous computing networks increase any project’s scope, scale, and efficacy of peer production, and as computer network connections become cheaper and more efficient the scale of information from nonprofessional peer production increases and is able to perform tasks of greater complexity than ever before. In Benkler’s 2006 book, Wealth of Networks, he updates his work by looking more closely at Wikipedia, Creative Commons, and open source software. He coins the term, “networked information economy” and defines them as “systems of production, distribution, and consumption of information goods characterized by decentralized individual action carried out through widely distributed, nonmarket means that do not depend on market strategies.”

In Thomas L. Freidman’s The World is Flat he pursues Benkler’s assessment and argues that with this cultural, economic and social change, the world has become horizontal, a non-hierarchical, non-geographic network, and with this shift a new sphere of globalization has emerged: globalization of the online, plug-in individual. The release of the first home computers, and the software breakthrough in user-friendliness of the early 1980s completely broke the physical and geopolitical
barriers of the past and in the process broke “the limit on the amount of information that any single individual could amass, author, manipulate, and diffuse.” Craig Mundie, chief technical officer of Microsoft, said “[we] created an army of people able to create this digital content more easily and cheaply than ever before – from their desktops, kitchens, bedrooms, and basements – instead of being required to access a big mainframe computer ... restricted for business purposes.” The digital revolution allowed anyone to disseminate any information. It gave people the power to connect and voice their opinion through online communities on a new global telecommunications platform. With the advent of the World Wide Web, and free and easily accessible browsers, any variety of digital media files were supportable and accessible across the world. The programmers that created system standards for maximum compatibility between machines, ensured reliability and encouraged more web commerce and business investment. With a standardized system, combined with easy to use home computers, and cheap and growing access to the World Wide Web an entirely new global platform for collaboration began emerging in the mid 1990s and served as the “Genesis moment of the flat world.”

Freidman sees commons-based peer production as the main driver in flattening the world. Collaborative online communities avoid traditional hierarchical organization and they emerge quickly from thousands of users, with no geopolitical position. They upload content anonymously, and form global communities overnight and have devastating potential to make traditional companies who sell a specialized proprietary product obsolete. These synchronous nomads voice peer reviews on Amazon that are becoming more important consumer opinions than any other published. In doing so, they reduce the authority of traditional icons like The New York Times Book Review and they do it almost unconsciously without leadership and hierarchy. Google functions almost entirely off user-generated content. Restaurant review company Zagat, founded in 1979, in the face of competition from Yelp and Urban Spoon was forced to sell to Google for $151 million. Zagat disappeared over night and was integrated into the Google + Local pages, a social network offering user reviews. The information was then made free and public to all Google users, negating thirty-two years of Zagat subscription information, and revealing the increasing power of participatory networks and user reviews.

Members of the new commons-based peer production are essentially self-policing review groups that notify all users when sellers on eBay are untrustworthy, when a product is dissatisfactory, or when a customer review is found helpful in their decision-making. These disguised, quasi-anonymous peer communities are the standards that determine your success as service providers, and sellers. They vouch for your credentials, and recommend your work ethic, and endorse your skills on Linkedin. They assess the sheets on the bed you are renting on CouchSurfing, and comment on the neighborhood of the space you are staying in on Airbnb. They are the voices that decide what news stories and headline hyperlinks are more important for you on Reddit and Slashdot. They are the uploaders and crowd-sorcerers: enormous armies of collaborators that create the web and complex horizontal systems...
Kevin Kelly, cofounder of *Wired* magazine, sees this trend defining what the Internet was originally intended for. He writes that in the beginning of Internet popularity, “download rates far exceeded upload rates [and] ... the dogma of the age held that ordinary people had no need to upload; they were consumers, not producers.” But today the asymmetry in bandwidth has leveled, and indicators show that it is tipping in another direction. Uploaders are destroying the image of the download consumer and every user is becoming a “prosumer” and a producer: co-creating the goods and services that are available for use.

Bruce Sterling discusses this technoculture evolution in his 2005 book, *Shaping Things*, and proposes a new relationship with objects and interfaces in the near future. Sterling sees that as we emerge from the stage of end-users engaging in a world revolving around objects requiring extensive interaction (i.e. upgrading, plugging in, plugging out, security threats, policy agreement that demand our attention and approval) that we are quickly transitioning into a world where the user becomes a *wrangler*, an active negotiator in a process of object interaction that is at our disposal. He gives the name *spimes* to these new objects, and sees them as material through an immaterial system: designed digitally, made digitally, seamlessly tracked through time and space digitally. *Spimes* no longer require interfaces and physical interaction but are made and unmade, folding back into a production chain with no waste. He alludes to an ecological symbiosis that is at the heart of open source, and he hints at a open source hardware future with recyclable 3D design and printing platforms, available through ubiquitous QR codes and then, with the push of a button, made real. Several videos posted on YouTube in the last few years featuring 3D printers have shown the degree in which the open source movement has progressed, along the lines that Sterling predicts. In these videos a user has broken a small plastic components in a light fixture or a kitchen cabinet, and a replacement part is not available, or can not easily be purchased. The user, in these videos, takes the measurement of the component and models it using one of several free 3D modeling programs. They then send this file to their RepRap machine, and within a few minutes they have a new plastic replacement, at the cost of plastic tubing. After they verify that it functions in the same capacity as its predecessor, they upload the file to a variety of 3D printing libraries. Then they digitally catalog the item and product number that it has just replaced, and make it freely available to other users who might find themselves in the same situation.

In *Wikinomics*, Don Tapscott and Anthony Williams’s trace the change from typical hierarchical relationships, to a horizontal transparent collaboration within corporations and new business models. As more firms see the growing benefits of mass collaboration, this new way of organizing workflow, *ce e ciency, and customer support eventually displaces traditional corporate structures and assumes “the economy’s primary engine of wealth creation.”

The growing accessibility of information technologies puts the tools required to collaborate, create values, and compete at everybody’s fingertips... Millions of people already join forces...
in self-organized collaborations that produce dynamic new goods and services that rival those of the world’s largest and best-financed enterprises. This new mode of innovation and value creation is called ‘peer production’ – which describes what happens when masses of people and firms collaborate openly to drive innovation and growth in their industries.\(^\text{13}\)

The principles behind these emerging industries are as follows: “co-innovate with everyone especially customers, share resources that were previously closely guarded, harness the power of mass collaboration, and behave not as multinational[s] but as something new.”\(^\text{14}\) The old tenets of business are being replaced with openness, peering, sharing, and acting globally. Companies that are open are making their boundaries porous to external ideas and human capital. These companies, like Raymond predicted, are outperforming those that rely solely on their internal resources and capabilities. Being open demands certain standards and modules for ease of compatibility and collaboration, and in the last decade a wave of open standards have appeared due to customer demand. In addition, customers want transparency in the commons and companies are embracing this and thriving. Research has shown that “transparency is critical to business partnerships, lowering transaction costs between firms and speeding up the metabolism of business webs, [also] employees of open enterprises have higher trust among each other and with the firm, resulting in lower costs, better innovation, and loyalty.”\(^\text{15}\)

With the flattening of global markets and cultural interaction, horizontal organizations have rivaled hierarchical firms and shown that their capacity to create information-based products and services is unparalleled. The “old hierarchical ways ... do not afford the level of agility, creativity that companies require” to survive in today’s environment.\(^\text{16}\) Being transparent, non-hierarchical, reliable and free, peer-products like Linux and open source software entities succeed because they leverage the benefits of self organization and mass information dissemination. Furthermore their success is welcomed through the stimulation and encouragement they offer to vibrant communities of enthusiasts. Tim Bray, director of Web technologies at Sun Microsystems says, “we genuinely believe that radical sharing is a win-win for everyone. ... Expanding markets creates new opportunities.”\(^\text{17}\)
The Internet has ushered in a new social network with open marketplaces, and peer production centers that are inherently rooted in the culture of open source collaboration. New conceptions of “free and accessible” are being defined and explored every time someone surfs the web, posts an answer to a question, or contributes a comment on media and opinion. This process reminds the user that the Internet is open source and set on a path toward progression and evolution of social exchange and advancement. Everyday there are more than 2 million blogs posted, 700,000 new members join Facebook to connect with old friends, and plug in to a network with 172 million visits daily. Everyday 532 millions statuses are updated and 250 million photos are uploaded and shared. Every minute there are 600 hours of new videos posted on YouTube. In a typical day, 1,288 new apps are available to download on Android and Apple tablets, and more than 35 million are downloaded. The torrent of popularity and trending of this ubiquitous opinion and interaction trickles down into physical action and community involvement. Popular magazines and daily news articles with titles about cooperatives and farmers markets, neighborhood gardens, peer-to-peer sharing, copyright law, torrent sites, crowd-sourcing, crowd-funding and community grassroots efforts to collect signatures and surveys to leverage popular opinion in municipal decisions. Whether the effort is done online, or organized locally, vast communities with a new socioeconomic culture are emerging that value Internet infused collective behavior, community participation, and self-organized public intervention.

Rachel Botsman and Roo Rogers define this phenomenon as collaborative consumption in their 2010 book, *What’s Mine is Yours: The Rise of Collaborative Consumption*. They see collaborative consumption as a new social and economical community of sharing, bartering, lending, trading, renting, gifting, and swapping: all redefined and based on an interactive web platform. People are using communication tools in radical new ways, and spontaneously intervening to reinvent the concept of the city and their role in it. The current recession and global economic constriction has caused people to “realize the enormous benefits of access to products and services over ownership, and at the same time [saving] money, space, and time” and they’re making new friends and joining new groups and becoming more actively engaged citizens in the process. In addition, the banking system bailouts, government response to slowing economies, and the public’s waning confidence in the democratic sphere have created a fertile ground for action. Botsman and Rogers see the correlation between collaborative consumption, open source software and hardware, and the green movement reinforcing societal desires for sustainability: “these systems...
provide significant environmental benefits by increasing use efficient, reducing waste, encouraging the development of better products, and mopping up the surplus created by over-production and [over]-consumption."

Collaborative consumption trends are gaining a foothold and thriving offline as well. Utilizing the social efficiency of the Internet, organizations are acting more productively and locally. Society has “reached a powerful inflection point, where we are starting to apply the same collaborative principles and sharing behaviors to other physical areas of our everyday lives.” In reaction to soaring fuel prices, people are commoning together. Bike sharing on a global scale has increased over 200 percent in the last year, making it the “fastest-growing form of transportation in the world.” Car-sharing programs have increased membership by 51.5 percent in the United States. Zipcar participation tripled in 2009, and by 2015 it is estimated that over ten million people will be Zipcar members in America and Europe. In January 2013, Avis Budget Group purchased Zipcar for $500 million, bringing membership rental cars to every large and medium sized city, and every airport in the United States. Peer-to-peer rental markets are popping up and growing at nearly 25 percent annually. On-line bartering networks are increasing at twenty percent, and two billion dollars were exchanged through Bartercard alone. Online swap sites are dramatically increasing in use: U-Exchange has seen 70% increase in membership, SwapTree grew tenfold, and Freecycle (a site that circulates free items) has nearly six million members in 85 countries, giving over twelve thousands items a day. Communities and shared resources are becoming easier to find and easier to participate in. SharedEarth, a site that connects interested gardeners with unused spare land, had over twenty five million square feet posted on their website in the first three months after launching. CouchSurfing, a site that offers spare sleeping spaces, has become “the most visited hospitality service on the Internet.” In the UK there are over 100,000 people on waiting lists to rent plots of land for agricultural use. In the US there are more than 2,500 community supported agriculture schemes whose services provide a weekly box of fresh produce to users’ doorsteps or at a local pickup location. The United States has seen a rise of local farmers’ markets from 1,700 in 1994 to 5,750 in 2009, making it the fastest-growing aspect of America’s food economy. All of these statistics reveal a new social order functioning in a variety of fields, and based on the success of internet organization.

With increased participation and membership in collaborative consumption new business models are attracting serious investment. Peer-to-peer lending markets are estimated to reach five billion dollars by 2013, and local rental services are now a $26 billion market in the United States. In fact, clothing swap markets just for children are bringing in three billion dollars in the US annually. Car sharing platforms like Zipcar have become 12.5 billion dollar industries. Even when the initial start-up idea and sharing resources like CouchSurfing are not established as for-profit organization, their existence paves the way for thriving companies like Airbnb, an important example for how collaborative consumption works. Like Linux, Airbnb is making every user a participant in a larger system: forcing innovation and spreading
the benefits to an increasing user group. Every user is creating a microeconomy, and the more microeconomies that exist the more participation and opportunities are offered within the system. By being their own service provider, an Airbnb host is presented with a completely different model for ownership and exchange; one that is purely driven by consumer motivation and the free available exchange of Internet information. Just as in Linux, it is self-interest that proves to be good for the larger community, and creates an active evolution through user input, and participation.

In 2010 Airbnb had 85,000 registered users, with over 12,000 listed properties in 126 countries. Since then, 112 million dollars have been invested in the startup and in 2012 they have over two million users, and five million bookings were made, reporting over 500 million dollars in transactions annually. *Fast Company* listed Airbnb #19 in the world’s “50 most innovative companies” for the following reasons: “The digital accommodations marketplace, which enables users to rent out spare rooms online for extra cash, was not only disrupting the stodgy hotel industry, but rocketing in growth – and leading the way in a new sharing economy.” The average New Yorker who rents out space on Airbnb makes over $1,600 a month. The average renter on Zilok makes over $1,000 a year on listing a bike or a digital camera for use between members. If a couple in Manhattan listed a spare room and a few items in their house that they were not using on a daily basis, they could expect to generate over $22,000 a year. As this type of lifestyle increases in popularity, larger markets arise to fulfill the demand. With a larger market, comes more competition, and the company and service that is quicker to adapt and be flexible, will be more resilient and successful. Open source processes increases the rate of adaptation through collaboration, and solidify their stake in the future of Internet and social development.

In 2009 Elinor Ostrom won the Nobel Prize in Economic Science for verifying the efficiency and success of self-organized commons-based societies. Her work demonstrates that “economics is not really fundamentally about markets, but about resource allocation and distribution problems.” This is something that both the cathedral builders and the bazaar builder, both socialists and capitalists can agree on. Because what is changing is a movement from a culture of hoarding and a culture of “what’s in it for me” to a culture of “what’s in it for us” discovering both side of “what’s mine is yours” – “we are beginning to see that self-interest and collective good depend on each other. ... It is in my self-interest to stop global warming; it is in my self-interest to participate in elections; it is in my self interest to correct an online entry on Wikipedia.” This collaborative individualism is not only pervading the web-savvy generation. There are indicators that the generational gap is shifting. It is not just the Millennials who are participating in collaborative consumption. Over twenty percent of all eBay users are over fifty years old, and there are more people aged fifty five and over on Airbnb than between the ages of eighteen and twenty five. The age discrepancies are indicators of social and economic division, but within collaborative consumption there are multiple ways to participate. There are “peer providers” and “peer users” and each individual whether one or both “could act in his...
or her own self-interest and at the same time produce a unified social sphere, in which we’re “all one.”

The importance of Linux and its eighteen million users, and its active group of 128,500 geographically separated volunteer programmers are working in self-interest to make the best possible operating system. The Internet turned Linux into an open infrastructure of unlimited sharing, a community of users eager to participate in something larger than their “consumer selves.” It is the Internet’s first example of crowd-sourcing coined and defined by Jeff Howe as the “act of taking a job traditionally performed by a designated agent and outsourcing it to an undefined, generally large group of people in the form of an open call.” It is this eager group of beta-testers who answers the call, who volunteers their time and their voice in the creation of a new economy, a new society and are forging the new culture of sharing. Now these groups have grown large enough that they are able to find members in close proximity, they are able to be localized, and they can now exist as small off-line communities. Members of Reddit, Craigslist and Meetup are “using the Internet to get off the Internet and form a twenty-first-century civil society.”

In What’s Mine is Yours, Botsam and Rogers organize their examples of collaborative consumption into three systems that reveal the structure in the current trends in consumption: product service systems, redistribution markets, and collaborative lifestyles. Borrowing directly from the open source movement, they see the following underlying principles that make collaborative consumption work: critical mass, idling capacity, belief in the commons, and trust between strangers.

The first system of collaborative consumption is product service systems. Botsam and Rogers define this as paying for the use of the product, the benefit of what it provides, without owning the product. In product service systems, products are owned by a company or an individual and are owned for the purpose of sharing and exchanging a peer-to-peer rental charge. Traditional examples include libraries, gym memberships, laundromats, and car pool services. More contemporary examples include Netflix, Spotify, Zilok, Rentoid, Zipcar and RelayRides, which organize privately, owned peer-to-peer exchange items and services. Product service systems are “disrupting traditional industries based on models of individual private ownership” and they have additional benefits far from just saving people money. Product service systems typically extend the life of products, because maintenance and repair services are typically offered in the service. In addition there are obvious environmental advantages as more is done with less, maximizing utility and efficiency. User benefits include saving money as payment is only needed when using the product, and by avoiding ownership, responsibility for maintenance, repair and insurance costs are also avoided.

The second system in collaborative consumption is redistribution markets which encourage an economy that values reusing and reselling old and used items when ownership of the items is no longer needed. This type of system redistributes and reduces waste and resources and “challenges the traditional relationship between producer, retailer, and consumer, and [disrupting] the doctrine of ‘buy more’ and

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"buy new." Examples include free exchanges of products (Freecycle, Kashless, Around Again); exchange of products for credits (Barterquest, UISwap); exchange of products for cash (eBay, Flippid); or exchange of products for negotiable ends (Craigslist). Websites have emerged that have replaced the familiar yard sales, garage sales, rummage sales, estate sales, police auctions, and parish auctions with a variety of easily accessible, online-hosted markets. This increase in user participation has increased the value of the items, and the value in which exchanges take place.

Selling books and accessories, or swapping toys and baby clothes becomes a lucrative exchange when people outside your location are bidding and participating. Websites like thredUp, MakeupAlley, Swapstyle, Toyswap, Dig ’N’ Swap, SwapTree, or SwapSimple will connect users with a wide variety of anonymous swappers who are looking for your old makeup, old toys, and old DVDs. It is an online free-for-all for scavengers, hoarders, people who are looking to make a quick buck, or environmentally conscious do-gooders. No matter the context, an efficient network of users interested in reducing, recycling, reusing, repairing and redistributing is emerging and expanding exponentially. It is in this second system that we see the power of idling capacity in the excessive ownership in America. The average home has three televisions, outnumbering the residents, yet they are watching less and less. One out of every five Americans owns a power drill, and the vast majority are one-time purchases, now collecting dust. Collaborative consumption is looking at ways of avoiding one-time purchases, avoiding dust collection, and redistributing this idling capacity, making money, saving money, or just doing something new and different with their possessions. Robin Chase, founder of Zipcar, says, “This was what the Internet was made for, an instant platform sharing excess capacity among many people.”

The third system that Botsam and Rogers identify as a critical drive to collaborative consumption is the increasing interest in collaborative lifestyles. This system is defined as groups of people who are not interested in exchanging goods and services but looking for social networks and communities with similar interests where they can share their time, space, and experience. They are looking for social connections and new relationships and they are finding it through websites like MeetUp and Reddit. There are organizations offering shared working spaces (Citizen Space, Hub Culture). There are goods distributors that are popping up locally (Neighbor). Collaborative lifestyles are creating networks for sharing tasks, time, and errands (DaveZillion, IthacaHOURs), sharing gardens (Urban Gardenshare, Landshare), sharing skills (Brooklyn Skillshare), food (Neighborhood Fruit), and parking spots (ParkatMyHouse). Companies like TechShop, started in Menlo Park, offer members access to industrial tools and equipment to manufacture their own goods. Classes and workshops offer training on CNC mills, plasma cutters, laser cutters, 3D printers, and a variety of textile machines in their warehouses, and tool rentals are also available. TechShop’s success allowed them to branch out from the Silicon Valley and they have current plans to open 20 other warehouses throughout the country in the next three years. TechShop will be discussed in greater detail.
in Chapter 5 of this thesis. The Internet is ubiquitous, and there is a new spirit and responsibility that cannot be ignored. There is no way to compete and survive without adapting to new models of mass collaboration and new modes of consumption. The culture of the Internet and open source software has a created a new consumption economy that contemporary architecture and construction industries poorly address. Architecture must address this shift, and case studies and examples will be presented in the following chapters.
In Design Methods, John Chris Jones dates the beginning of literature on the topic of alternative design methods to the 1960s. Before then design was “what architects, engineers, industrial designers and others did in order to produce the drawings needed by their clients and manufacturers.” In the 1960s, there was a growing tendency toward populism in design: an effort to co-create what people want. Many designers were attempting to reject the authority and specialization of training, and simplify design as a process, not as an outcome: as a recipe of simple ingredients that could be relied on in all situations. Jones admits that the “fundamental problem of design is that designers are obliged to use current information to predict a future state that will not come about unless their predictions are correct.” The pace of change in society and technology in the 60s was so dramatic that the old way of designing and building was being rendered obsolete, and the predictions of designers poorly addressed this rapid change. Designers had to “evolve quickly, and adapt to the growing complexity of the man-made world,” and they did this by decentralizing decision making, and creating alternative approaches to architecture and its interaction with the public. Jones creates a recipe book of various methods with supported case studies, but concludes that there are as many methods as authors. Though the effort to simplify and restructure the process of design is critical, he saw architects and designers tending to assume an even more hierarchical role as the designer and architect of the system and the process. In relinquishing their authority in the building process, and in the aesthetic and compositional choices being made, they assumed a greater role of the meta-architect: the designer of the system in which to design. This contention would be made more obvious and relevant in the years to come through post-structuralist discourses offered by Foucault, Deleuze, Bey, and others, but it is important to look now at how and where these alternative techniques were developing to see what alternative system would support this existence. Open source software would provide a new model that answers these concerns and offers a platform for those who sought to seize the tools that write the tools that write the system. It does this by “deconstruct[ing] the otherwise stable and antithetical subject position of ‘developer’ and ‘user’ [making the user] who was formally the colonized subject of imperialist cathedral-builders, now participate in the development of the code and [becomes] and equal ‘owner’ of the code.”

Since Vasari’s Lives of the Painters, there has been repugnance toward anonymous, authorless architecture. He writes in the 16th century: “There were built, then [...] many edifices of importance in Italy and abroad, whereof I have not been able to find the architects [...] built at incredible cost [...] I cannot but marvel at the
rudeness and little desire for glory of the men of that age.” This sentiment, through his encyclopedia and artist biographies, endured and helped create the heroic imagery of the designer and architect, attributing special insight into living and dwelling and the responsibility of the architect to represent cultural values and artistic integrity in buildings of the time. Overtime this specialization and importance of glory and worth that Vasari describes, led the way for the branding of this architectural persona and ultimately that branding has become a product of design itself. Bernard Rudofsky, in *Architecture Without Architects*, presents an exceptional collection of architecture examples made anonymously throughout the world and that embody creative collective vernacular works that rival the individual designer and that remain authorless. In the 1960s, synchronous and consistent with the early hackers and computer programmers, an emerging cultural reaction from artists, architects, and urban planners began questioning authorship and hierarchical top-down approach to design. There was a fear of corporately controlled information, of indifference and of regulation in bureaucratic power, and a fear of ignorant masses following the status quo and not asking the right questions of society. There was a fear and distrust in rapid technological advances, and an unbalanced social upheaval that was spreading over developing areas and their consumption of energy and resources. The neo-liberal, and the green and hippie utopian movements were reacting to this cultural shift. But without the tools of mass collaboration and public opinion that were introduced to the world through the Internet, the ideas of the 1960s and 1970s never reached their full potential. Today, however, important figures and seminal texts from the counter-culture scenes of the period are reappearing in the blogs and online magazines of today’s open source movement with wider readership than ever before. Issues and ideas that lied dormant are converging achronistically and offering
new and insightful applications to new open source technologies. Issues of labor and outsourcing, overpopulation and the studies of the informal city, the value of intellectual property in the age of downloading and uploading, and the burgeoning potential of new desktop technologies have stimulated a solidified movement in open source hardware: the immaterial software becoming material. The ethos of the 60s and the resistance to authorship is being revitalized with a more informed public that are questioning the delineated lines of authority and hierarchical structures. They are questioning the Modernist approach to a one size fits all urban environment, and they have new tools for social activism to voice in mass scale now what they could not then. The author today becomes the anonymous network, the hidden identities of its users become the constituent parts. The structure is the manifestation of what the code allows, and each user has the opportunity to change and re-write the code. By recognizing this system, open source design today is building within these new constraints. Works from the 1960s will be discussed in the following pages to reveal an architectural lineage of alternative approaches to design, and the resounding popular opinion of freedom of choice, and the customization of one's built environment.

Constant Nieuwenhuys, a Dutch artist and founding member of the Situationist International, began working on a utopian project entitled New Babylon. In this project, citizens were completely mobile, not tied down by work or land ownership. The city was a network of collective services and transportation floating above the ground on stilts. In 1958, Yona Friedman’s Mobile Architecture, and Ville Spatiale described a similar mobility and freedom for inhabitants within an infrastructure that encompasses a minimal footprint, is capable of being dismantled and relocated, and is free to be modified and altered based on the preferences of the individual occupant. Friedman saw architecture as open communication and as an instrument freely available to all for creating relationships between inhabitants. He rejected the tabula rasa of Modern Architects and Urban Planners after World War II, and envisioned a similar New Babylon horizontally expanding elevated structure available to plug-in and plug-out that served as an extension to the city, as opposed to its replacement.

In 1960, Team X, comprising Jaap Bakema, Giancarlo de Carlo, Aldo van Eyck, Alison and Peter Smithson, Shadrach Woods and several others formed a small utopian group of urban planners and young architects who also rejected the principles of International Congresses of Modern Architecture (CIAM) and worked together to publicize an improved Modern Architecture that could better serve as an economic and political tool for European cities. In 1961, Jane Jacobs authored The Death and Life of Great American Cities, where she openly criticized top-down planning policies and their responsibility in the decline of cities and the destruction of neighborhoods. Instead she proposed interactive, self-organized ecosystems, mixed-use urban development and a bottom-up approach to planning in consultation with local inhabitants. In the same year, Archigram, and in 1966, Archizoom, offered a satirical response to detach buildings from politics, offering a critique on Modernism and
exploring flexible and technology-based approaches to urban intervention, similarly to Friedman. From 1961 to 1970, Colin Ward, an architect and leader in the UK anarchist movement, edited the journal *Anarchy*, and gathered a group of thinkers who looked to relinquish authoritarian forms of organization and governance in place of an informal and self-organized mechanism based on non-hierarchical structures promoting amateur building tactics.

In 1964, Bernard Rudofsky published *Architecture without Architects: A Short Introduction to Non-Pedigreed Architecture*. In it he offered a new and radical lens on communal vernacular architecture from outside the Western world, springing from the intersection of human intelligence and collective experience and creativity. He roots architecture as a social design process dating back centuries as the true history for architecture’s evolution. In 1965, Drop City, the first rural hippie commune, was established in southern Colorado. Its 18 members redesigned Fuller’s geodesic domes into small scales housing prototypes using salvaged materials. The group lived and worked together, avoiding any hierarchy and collaborating together on every project. They showed to the public, an alternative lifestyle, off the grid and away from mainstream life. In 1968, influenced by Drop City, Stewart Brand edited the *Whole Earth Catalog*, creating a DIY handbook for those looking for self-sufficiency. Borrowing from Buckminster Fuller and Gregory Bateson, he offers a holistic model for society and for how a grass-roots movement could be equipped with tools and become a reality. The topics covered in the handbook range from methods of building, to organic farming and recycling solar and wind energy. It was the first paper-based database, a proto-blog that validated the amateur and the democratization of information access. In 1968, Buckminster Fuller published *Operating Manual for Spaceship Earth*, and “Earthrise” was taken by Astronaut William Anders. As Americans meditated on the new scale and fragility of the planet through images from Apollo 8, and war footage from Vietnam, the counter-cultural movement continued to pursue sustainability, self-sufficiency, and DIY manuals. Mike Reynald’s Earthship Biotecture, and the introduction of Cob construction techniques in the Pacific Northwest and the Southwest regions of the United States or the subterranean movement seen in Mike Oehler’s *The $50 & Up Underground House Book*, and later sustainable efforts in Latin America and elsewhere through efforts like Johan van Lengen’s *The Barefoot Architect*.

In 1969, “Non-Plan: An Experiment in Freedom” by Paul Baker, Reyner Banham, Peter Hall and Cedric Price explored the idea of allowing anyone to build anything anywhere by abolishing all zoning codes and planning regulations in various regions of the UK. In the same year, Giancarlo de Carlo, an Italian architect, wrote “Architecture’s Public,” an important essay espousing the political and social role of the architect and the need for inclusion of users in the design process. De Carlo denounced his role as architect designer, and assumed the role of facilitator and educator in assisting a group of steelworkers and their families in the design of the Terni Social Housing project, which produced over 45 different typologies for 250 housing units. Through all of his work, the paramount importance of architecture
is to question the formation of the public sphere, and to reevaluate, and implement the role of participation. Echoing the tenants of open source software, de Carlo acknowledges that “professionals are against [participatory practice] because it increases and stratifies responsibility, transfers design from a personal practice to a social area, and reveals professional secrecy.”

In 1971, Gruppo Strum, founded in Turin, distributed pamphlets to political protestors, containing picture stories about new architectural responses in the city. In addition, they organized seminars and worked closely with the public, further pushing a new concept of architecture: one that moves beyond static buildings, and products, and identifies architecture as a form of cultural critique: a tool for social and political debate. In 1972, Charles Jencks coined the term “adhocism” and he and Nathan Silver published Adhocism: The Case for Improvisation in which they analyze the practice of “using an available system or dealing with an existing situation in a new way to solve a problem quickly and effectively [with] resources already at hand.” They praise the spirit of adhocism, as the invention of something economical and utilitarian that addresses a certain solution and a particular purposes. He writes, adhocism “cuts through the usual delays caused by specialization, bureaucracy and hierarchical organization.” Recalling Louis Sullivan’s push toward a democratic architecture, Jencks’s writes:

A new mode of direct action is emerging, the rebirth of a democratic mode and style, where everyone can create his personal environment out of impersonal subsystems, whether they are new or old, modern or antique. By realizing his immediate needs, by combining ad hoc parts, the individual creates, sustains and transcends himself. Shaping the local environment towards desired ends is a key to mental health; the present environment, blank and unresponsive, is a key to idiocy and brainwashing.

In 1974, Gordon Matta Clark and the Anarchitecture Group, based in New York, put on exhibitions commenting on the relationship of anarchy within architecture, supporting an adhoc mentality to building and collaboration, and critiqued consumerism, property rights, and land ownership.

What often manifested itself in research-based collaborations producing writing, became increasingly more solidified in self build construction techniques utilizing the availability of manufactured standardized materials. Modular construction systems became the ingredients for a new architectural soup, and the more flexible and more compatibility, the more often it appeared on the menu. The formal structure and concept from Le Corbusier’s Dom-ino House and his “plan d’obus de’alger” reappeared and combined itself with industrial steel manufacturing, which was in abundance after World War II. Post-war aircraft companies were experimenting with prefab houses, and this new industrial response was seen in the Dymaxion House, the Case Study Eames House, the Dornier-Heim ready-built houses, and later adapted to the Metastadt Wulfen, Habitat 67, and the work of Richard Dietrich, Herman Hertzberger, and Otto Steidle to name a few. These modular steel and concrete frame matrixes borrowed heavily from the vernacular
concepts from Japan, and American frame-houses, and inspiring several architects and builders to create modular structures and flexible components, utilizing design guidelines in which every user could participate. Many architects during this time avoided the prefab holistic design, as product, and instead focused on the creation of kit of parts systems, which could offer greater customization, thereby addressing the architectural resentment and cultural criticisms of the era. In addition, the 1960s and 1970s saw a popular readership in DIY home improvement magazines, and DIY how-to books soon flooded the market. Reader’s Digest’s Complete Do-it-yourself Manual was published in 1973, and Sunset Books, Time-Life, and Better Homes & Gardens soon followed suit. In 1979, the PBS television series This Old House premiered and the DIY television revolution began.

From 1954 to 1974, Ken Isaacs, American designer, and head of design at Cranbrook Academy of Arts created a series of Matrix based modular systems called “Living Structures.” It utilized simple and freely available hand held tools and inexpensive materials found at local hardware stores. Published in 1974, How to Build Your Own Living Structures documented the necessary materials, and steps in purchasing and selecting materials, cutting wood, and assembling microhouses, living structures, and inhabitable large scale furniture for exterior and interior conditions. His first microhouse is featured in 1954 article in Life, entitled “Home in a Cube,” but it seems that his drawings, and designs were not made public and freely available until after the examples offered from the Whole Earth Catalog. Isaacs was part of the counter-culture movement that was reappropriating the systems and structures of architecture and facilitating new user participation. He shows a fascinating approach to community design, and the democratization of architecture and building through freely available blue prints that is rare in the field of architecture and design.

Similarly in 1970, Walter Segal, a British architect, created a design approach for a self-built house based on timber frame construction without the need of any wet trades (concrete, bricklaying, and plastering). The construction components were lightweight, demountable, utilizing bolts and screws only. It was a flexible and additive architecture, which addressed the need for personalization and participation which had been absent from the homogenous post-war mass housing of the time. The house was essentially a traditional Japanese house, or an American frame house except that Segal focused on the matrix and spatial layout with regards to standardized materials, avoiding waste, and facilitating additions for the future. The building process that Segal developed encouraged children and the elderly to participate and created an enthusiastic community around its production. He made no claims for originality and never pursued patents. His intentions instead were to help alleviate the problems around housing by offering an interactive and cheap way to design and build a home, knowing that he could not control the inevitable aggravations around inflated prices of land, and planning and building code restrictions that “Non-Plan” had discussed.

In 1977, Christopher Alexander, professor emeritus at UC Berkeley, along with Sara Ishikawa and Murray Silverstein published The Timeless Way of Building and
**A Pattern Language: Towns, Buildings, Construction** offering another democratizing effort in architecture. In it they created a generative grammar influenced by computer programming. The book offers a sourcebook: a system of rules, relationships and references, that when combined produce results through scalable patterns. Alexander gives the language a networked structure and presents methods for constructing safe, and affordable designs in any scale and gives agency to the user in the organization and combination of patterns. He circumvents the existing methods of hierarchical domination and gives the user the language in which to speak his voice. In his metaphor he acknowledges the inherent nature of language for misunderstandings, arguments, negotiations and debate, and provokes the user to engage in its evolution.

Each solution is stated in such a way that it gives the essential field of relationships needed to solve the problem, but in a very general and abstract way—so that you can solve the problem for yourself, in your own way, by adapting it to your preferences, and the local conditions at the place where you are making it.10

Alexander and his group at UC Berkeley created an alternative approach to design that allowed anyone to author, and continued a revolution in the reevaluation of the process and context of design.

The authorless, self-correcting, self-policing nature of the Internet is an alluring factor for urban planners and architects who survey and study *favelas* or makeshift urban landscapes. In the *favela* and the Internet, infinite webs of networks and connections evade hierarchy. Harkening back to Jane Jacob’s intentions for New York, the power of chaotic self organization spirals into a complete sustainable ecological system. Those who look at informal cities, and this new networked ecology, question the inherent hierarchy and structure of large architectural projects, and the interstitial spaces where hierarchy seems to dissolve. Michael Truscello, in “The Architecture of Information” questions the possibility of an anarchist autonomy and a surveillance society within the model of open source software and its analogy to architecture.11 He goes on to site Foucault’s analysis of the Panopticon and the power of surveillance on the shaping of societal norms and behaviors. He presents the argument that the vast chaotic networks of communication in the Internet, create a “Superpanopticon” where the structure of surveillance (the walls, windows, and guards) disappear with the change in the structure of power. He writes, “not only does the Superpanopticon erase spatial and temporal restrictions through the immediacy of information exchange, it also challenges the social hierarchy by [evading] the existing methods of domination.”12 Because the “subject” and his identity and location are amorphous on the Internet, the user becomes autonomous and empowered by their anonymity. This argument further justifies the successes of Linux, by realizing the inherent challenge to centralized structure on the network. Anyone can be anybody and their potential power to change and participate is equalized. Given this view, Deleuzian concepts of control are diminished as any arguable source of fixed, localized power and they become irrelevant in the bazaar model of program

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16 *Favelas: A Networked Ecology*

17 Self-Built Skyscraper: Torre David


12 Ibid.
development. The notion of enclosed and rigid power must be viewed from the source of the code and language itself, and all users have equal access and power over the code. Hakim Bey's principles and Lebbeus Woods's *Freespaces* become increasingly relevant for a discussion about open-source software and its direct manifestations in architecture. What Woods and Bey contribute to the discourse on open source is that they view open source as the creation of “an anarchic space for tactical intervention in the surveillance and control society by making the principal means of control, the code, 'visible' to the greatest number of subjects.”13

Woods’s *Freespaces* proposes informal and quasi-temporary public spaces that do not impose an architecture and a behavior, rather they are a consequence of their surroundings and of network subjectivity. He writes that the hidden city in Berlin “is called a free-zone, because it provides unlimited free access to communications and to other ... networks at present reserved for the major institutions and government and commerce.”14 His views of a “heterarchic” architectural space defined by its users, is a direct correlation with Linux. In addition, Hakim Bey’s *Temporary Autonomous Zone*, is a corollary to Linux, because it is anonymity and vagueness that makes it a success. It is an enclave that cannot be isolated or located, a group of pirates adrift in cyberspace. He writes, “The TAZ is like an uprising that does not engage directly with the State, a guerilla operation which liberates an area (of land, of imagination) and then dissolves itself to re-form elsewhere/elsewhen, before the State can crush it.”15 Design and architecture has evolved to reflect this Internet culture, and it must recognize its control and freedom. Linux and open-source software only came to fruition because of the Internet, and now the Internet is transforming open source software into hardware and bridging the gap between the virtual and the physical.
What started out as the sharing of software and computer code applications has crystallized into a prolific open source movement that has had a dramatic effect in the increasing presence in collaborative consumption and its role on peer production online and offline over the last decade. Virtual volunteering examples like Wikipedia have become ubiquitous, and trusted through its self-correcting nature further emphasizing the power, scope, and success of the open source subculture for the public at large. Besides being embraced by amateurs, hacker enthusiasts, and governing bodies tight on budgets avoiding copyright infringements and proprietary contracts, advanced scientific fields are opening their research and work to the public; crowd-sourcing public interest, volunteer labor, and opinion. Starting in November 2000, after dramatic budget cuts, NASA experimented with a virtual volunteering platform called Clickworkers, where a group of amateur volunteers would sort and assemble surface topography and information from satellites from the Viking Orbiter over Mars. Their assignment was to sift and stitch together close to two million photographs of the Martian surface, identifying craters and undocumented landmarks for a new map of Mars. Throughout the year, unpaid volunteers performed the tasks that would have normally been given to paid graduate students, interns, and scientists. At the end of 2001, 85,000 users recorded 1.9 million entries and successfully catalogued the entire surface of Mars to a level of accuracy that surpassed what would have typically been the result of a paid NASA staff. This experiment verified Linus’s Law outside computer software scripts, showing that a group of enthusiastic volunteers is better equipped to collaborate and recognize areas in need of correction. Furthermore, this extension of Linux Law added the fact that work in the commons allows amateurs to outperform trained specialists.

Since 2001, experiments like this have been tested in the fields of geophysics and the search for new oil reserves, medicine and robotic surgery tools, genetic coding, and a variety of other fields including the automotive industry, news media, and game design, all yielded concurring results. Earlier this year, the medical profession has begun engaging increasingly in open source methods, where examples in the UK and Italy have made patients’ medical records public, hoping to crowd-source cures, treatment, and patient support for diseases like cancer. The group Cancer Research UK has teamed up with Amazon, Facebook, and Google and is “trying to get people to search for mutations in DNA which lead to cancer” because there is simply not enough scientists and resources to tackle the amount of data which must be analyzed case by case by the human eye. Examples like this show the proliferation of the open source culture, and this growing interest and
support has pushed open source from the soft (data, and code) to the hard (physical products) coalescing to form the current maker culture. Over the last decade open source hardware has become an increased presence in the open source culture and when paired with open source software an entirely new response to resources and technological tools are at the public’s disposal.

Arduino is an open source hardware project that has created a single-board microcontroller (a computer circuit board) that is allowing users to create, inside and out, a completely open source computer. Originally designed in 2005, Arduino has amassed a huge following, spawned over 16 versions, been used in over 300,000 applications, and just recently caught the attention of Google who has decided to incorporate Arduino into its “Android Open Accessory” kit. Phillip Torrone, editor for *Popular Science*, has speculated that the adoption of Arduino will cause an explosion of software creativity without any legal tiptoeing, and will single-handedly force Apple to “abandon their restrictive ‘Made for iPod’ program and adopt the Arduino ... for accessory development.”

When the decision of one of these corporation can dramatically change the directions of its competitors, Google’s open “Kinect-style” surge of creativity for the Android, must be faced and met through similar moves by Apple and Microsoft. A decision by one company, proves to be a decision by all, and this results in forcing the public to engage and accept this change.

The Arduino, being the most popular open source and freely programmable and distributable circuit board is finding its place in a wide range of high-tech open source hardware project. The high-tech maker culture has implemented the Arduino in every robotics and computer project thinkable, being seen in the ArduCopter, a full-featured multicomputer UAV, similarly seen in the Occupy Wall Street movement as make-shift drones and helicopters (the Occucopter) attached

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2. RepRap: Self-Replicating 3D printers


5. Ibid.
with an iPod to survey incoming police groups, and to document and publicize the movement on YouTube. Open source computers using Arduino have found popular governmental support and NGO funding for its use and application in the production of cheap, non-copyrighted computers and routers for programs dedicated to putting technologies in the hands of those without. The Arduino community of programmers and technicians, and amateur enthusiast can, without fear of copyright, build, rebuild, and upgrade essentially anything computerized, and can have complete control and freedom to customize and specify its requirements, and its future manifestations. Examples exist where university labs and professors or retired military technicians have grouped together and participated in the Arduino design community, jolting it into further advancement and into a land of new potential for an enthusiastic commons.

In 2005, Adrian Bowyer, a mechanical engineer at the University of Bath, decided to start an initiative to develop the first open source 3D printer. The concept was a 3D printer that followed all GNU General Public Licenses, that would implement open source software with the Arduino system, and create an entirely open source product free for download. Furthermore, the open source 3D printer, named the RepRap project, would, through additive manufacturing techniques, self-replicate thus it was designed to 3D print itself, and its clone. In 2006, the RepRap 0.2 prototype successfully printed its own components, which were subsequently used to replace it as it grew vulnerable to wear and tear. Every component is a prototype replaceable by its constituent whole. In 2008, RepRap 1.0 Darwin successfully created its first child, and after its child was printed and pieced together by its inventors, it began production of its grandchildren. Currently there are 4 available models offering different sizes and speeds, and can be printed and mailed to you by other RepRap users. Once a user owns a RepRap, they may be requested to print parts for other users, creating an online and offline self-replicating maker culture all for the price of the plastic, and a small mail order kit of metal structural support and rubber belts. Or the user can go to eBay and buy a kit from another user for less than $500.

In 2006, to capitalize on this growing maker culture Jim Newton rented out a 15,000 square feet warehouse space and created a workshop for inventors, hobbyists, artists, automotive fanatics, mechanical engineers and model makers that through a monthly membership fee of $125, share access to equipment, supplies, expert support, and the space to work on various projects. This “community tinkering space” is called TechShop and was started in Menlo Park and has quickly drawn over 500 members. Three TechShops have followed in the Bay area, opening shortly after the success of the first location in the Silicon Valley. In 2009, a TechShop opened in Raleigh-Durham, North Carolina. In the same year, the largest TechShop opened in Detroit sponsored by Ford and Autodesk, hoping to address and revitalize the history of ingenuity and fabrication around the automobile industry. Another has been opened across the street from a Lowe’s Home Improvement in Austin, Texas, and they two companies have arranged agreements on classes and materials offered. Three others are now in Philadelphia, Seattle, and Portland, Oregon, and another
is planned to open in Miami by the end of the year. TechShop plans to open 20 more shops in the coming years, but community-operated spaces like this have been popping up informally, with less structure and membership fees than TechShop. These semi-permanent and formal spaces are called hackerspaces, and are networked online together supporting each other through forums and advice, and funding assistance as well. According to hackerspace.org there are currently 700 to 1,100 active locations in six continents, located in garages, after-hour offices, academic facilities, and community centers. These hackerspaces are increasing awareness and use in open source hardware and free software, and are allowing people to connect and share resources and knowledge to design and build. Similarly online-hosted local tool lending libraries, are appearing in proximity, and high-tech flea market are emerging physically, joining forces with the hackerspaces to create a completely equipped subculture for amateur and professional makers, bringing tools and manufacturing capabilities to anyone interested.

To support this burgeoning maker culture, crowd-sourced funding and micro-lending sites have arisen to address the issues regarding up-front expenses and to cover initial startup costs. Kickstarter, described as “the people’s NEA,” has risen over $381 million with a forty-four percent success rate for launched projects since its inception in 2009. In February 2012, an iPhone dock designed by Casey Hopkins, became the first project to break a million dollars pledged. That same day a group of independent computer game developers working on a project for a new adventure game broke the million dollar mark and went on to receive $3 million in pledges. In May 2012, Pebble E-paper Watch, a watch developed to work like a smartphone for iPhones and Androids, received $10 million in public pledges, and has caught the attention of Apple for further development. Though these examples may be seen as exceptions, the average successful Kickstarter project, from the absurd to the practical, receives four figures ($1,000-$9,999) in pledges, showing the reality of crowd-sourced funding models further fueling the maker culture. By publicizing ideas and the funding effort, Kickstarter is spearheading the introduction of start-up concepts and talented individuals to interested employers and networking similarly slanting enthusiasts who can help not only financially support the project, but collaborate on its further development.

These examples are offered to show that the manufacturing commons of the maker culture are quickly imposing on the realm of professional design and its tools for manufacturing. How can industrial designers, furniture designers and architects compete in a networked information system that allows downloadable manufacturing kits that produce downloadable designs? For the first time since before the Industrial Revolution, the amateur now has all the tools and information needed at their disposal, and for the first time in history it has a growing free library and a surging crowd of peers offering free information, support and advice. With crowd-funding sites and an online culture quick to embrace design, the environment is rapidly evolving into a new future of design that architecture fails desperately to address. With free and available apps like MagicPlan, a user can quickly and accurately create

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a plan of any given space by standing in one place and taking a photograph of one’s surrounding. That individual can then upload that data (as a .pdf or a .dwg file) to Google-developed SketchUp, a free 3D modeling program available for download. With SketchUp one can extrude plan information into a full-scale 3D model of an existing condition, or they can add and embellish creating a space entirely their own. This 3D file depending slightly on scale and scope can be sent to a free app, downloaded through SketchUp forums, like SketchUcation, that creates waffle cuts at determinate intervals for laser cutting and CNC milling production. If one wants to avoid digitally fabricated pieces, another app can create typical trusses, or wall and roof assemblies from your model with required legal specs. Very quickly and easily, and completely free of charge, a basic roof model of an addition to the user’s house can become a system of 2x10 joists, with specified insulation and fasteners, that will pass local engineering and safety standards. This 3D model can be sent to a contractor and can serve as the working drawings for most residential, non-structural projects, or one can gather the materials and perform the work themselves. The process of finding suitable, approved, and peer reviewed contractors, engineers, electricians and plumbers is a click away, and the bidding process can be made public as well, forcing online peers to voice criticism, consent, and opinion on the terms and scope of the proposal. Design, material choices, and bids and contracts can be crowd-sourced, and with the help of online enthusiasts better and more appropriate choices, terms, and prices can be discovered.

The average user can easily design and shape their home with free and online hosted tools that are fundamentally challenging the role of the architect in residential projects and beyond. Not only can the user crowd-source information and design, and contribute to any ongoing open source design project, but the user can then build advanced manufacturing tools like CNC mills + 3D printers allowing them to fabricate their design in its entirety. The Internet and the maker culture is essentially creating a free downloadable and revisable Sweets catalogue, and all the parts are included in the download. Websites like Thingiverse, Instructables, Shapeways and GrabCad all offer growing libraries of downloadable files for 3D printing, CNC milling, and laser cutting. If a user does not have access to their own or a local 3D printer, these websites offer the service to print and ship these items to the user. In March 2013 it was reported on BBC that the company responsible for developing 3D printed gun parts have announced plans "to launch a new firm, dedicated to copyright-free blueprints for a range of 3D printable objects."


Defcad will become the Pirate Bay of 3D printing, a popular, illegal and highly contested torrent engine for downloading files. Cody Wilson, a law student, is the brainchild of the Defcad, and has created Defcad.org which has within the last month seen 400,000 visitors and is currently publicly asking for funds. He writes: "Help us turn Defcad into the world’s first unblockable, open-source search engine for 3D printable parts." He goes on to announce that the items that will be listed will be “important stuff ... not trinkets, not garden gnomes but the things institutions and industries have an interest in keeping from us; access, medical devices, drugs, goods, guns."
What has become popular through crowd-sourcing efforts by Google and Amazon has spread to nearly every professional corner in every field. Yet architecture lags behind, even when industrial designers, and urban planning have been increasingly catching up. This lagging is not fully understood, and as it is not adequate to dismiss open source architecture as soft science from hacker activists, because now open source software has developed into an expanding culture of open source hardware, and the physical and the virtual constraints of shared and collaborative work are disappearing. The questions arise, how do we crowd-source architecture? How can architecture be made more open source and for and from the commons? What are current examples of the evolution of this progress, and how do we make architecture relevant in a globally networked information society? These are the questions my thesis project hopes to address, and several case studies will be included at the end of this chapter to introduce the built studio project.

I have come to the realization through my research that specifically in residential projects, and in the early design phases of larger scale projects, the architect is no longer needed. If one works within given zoning restrictions, and within typical structural specification, the user can displace the architect, completely erasing him from the process. Whether that be through the addition of a open source kit house, or the renovation of an existing space, advanced digital tools are free to use, and a community of interested peers is growing to fulfill this setting, and address the learning curve from DIY low-tech adhocracy to a high-tech maker culture. Advanced cutting edge manufacturing techniques are now at the hands of anybody who chooses to download them. The result is a growing open design library of downloadable architecture, and inherently the code of the software is also released under a creative commons license thus encouraging others to produce similar work forever free from copyright and patent infringements.

As has been discussed in the previous chapter, the DIY movement of the 60s and 70s essentially rejected the hierarchical bodies of the institutions and democratized the professional practices of architecture. This rejection put professionals on the defensive, forcing them to dismiss and ignore the adhocractic and push toward the post-modern. Struggling to protect their livelihoods, the architect was inclined to increasingly separate itself from the amateur and embrace the advent of technological and proprietary software rejecting the DIY of power tools, and assemblies based on easily accessible hardware items. The guidebooks and the recipe cookbooks of DIY design of the 70s and early 80s was abandoned by the alluring technical specs of the nascent AutoCad, and similar 2D computer automated design programs. This teamed with the increasing importance on legislation, zoning, and insurance during the 80s and 90s further spawned this division of architect and amateur. As Paul Atkinson writes, “the professional became the connoisseur,” the high-taste stylist with the perfect palette. The amateur again recognized the architect’s superiority, relinquishing to them the power of experience and know-how that would not be contested by the public as long as architects controlled the technologies and tools. The post-moderns, obsessed with complexity and inclined...
to high-tech modeling, and the reordering of historical and programmatic norms, further separated the public from an engagement in architecture by elevating architectural theory around an elite high-tech aesthetic. The market of the modernists and their machine fabrication enforced cheap, easily accessible products, and created a situation where the amateur would rather purchase from low cost modular IKEA-like products available with minimal assembly and wide variety, then spend their time and energy on the design process. But as modernism has showed that no particular singularly designed solution can withstand variety’s test, a more user-centered approach to design replaced it, and has become the commonplace mandate in contemporary architectural design. The appearance of rapid prototyping technologies that emerged in the late 80s, at once expensive and requiring high level understanding, has been disseminated; and, are now freely available through a variety of online platforms. These low-cost descendants have enabled a maker culture set on desktop fabbing and collaborative designing and manufacturing of individualized products in the home, of components of the home’s construction, and in certain cases, homes in their entirety. Now technology and the maker culture is taking back the tools they have been denied, and as Ivan Illich describes in *Tools for Conviviality*, “inverting the present deep structure of tools [in order to] give people tools that guarantee their right to work with independent efficiency.” Technology has now moved the public’s expectations from a position of co-creation to one where each user has the capability to completely design and manufacture products by themselves. The emphasis on user-design remains paramount in the field of architecture even though other design fields have moved far beyond and into the priority of co-creating, promulgating collaboration and the process of co-designing with professionals. Architecture, in its own self-interest, has avoided this, and by doing so it is stuck in the past twenty years failing to see that today, “the cult of the connoisseur has given way to the cult of the amateur - those who know themselves what is best for them.”

Paul Atkinson writes in *Open Design Now: Why Design Cannot Remain Exclusive* that the processes of technological development that have simultaneously driven amateurs and designers further apart, are bringing them closer together and forcing the removal of the barriers between them completely. Atkinson, an industrial designer, writer, and educator, offers a similarity to the description of Hakim Bey’s TAZ, and Lebbeus Woods’s *freespaces*, discussed in the previous chapter. He writes, as if paraphrasing them directly:

> The open distribution network of the Internet promotes an interactive and iterative process of creative design development amongst a globally dispersed group of potentially anonymous participants: a virtual band of individuals who can coalesce around a particular design problem, and who may or may not includes design professionals. After ‘solving’ a particular design problem, the band dissolves, only to reform with a different membership around a new problem [equipped with] advanced manufacturing capabilities.

To rephrase Paul Atkinson: the [architect’s] role has “moved from creating fixed products to a more fluid digital presence, where they may not be totally in
control of the content constantly being added to their original creation, if they themselves even originally created it.”\textsuperscript{18} The architect and the user are now one in the same, voicing the same concerns and participating in the same open process of negotiation. The widespread adoption of the once private and out of reach tools and software of the designer is not an affront to architecture, nor an affront to the architect’s training and expertise. Rather it is a force of evolution, the material and immaterial context that must be addressed and disputed for architecture to remain relevant. The architect is being subsumed but he is not disappearing. His role is changing; and, this change will provoke a sea change in the concepts of design and ownership and our relationships to the built environment. The existing zoning and legal structure and its traditional models of authorship and ownership will have to evolve in response to maker culture trends, and it will be forced to recontextualize itself in the face of open source systems of design and production. Trying to protect these quickly outdated standards will only lead to disappointment and financial heartbreak, lessons that have been publicly learned over the last two decades from film and music production, and the surrounding milieu of pirating. Architects must learn to cope with the fact that anybody with a laptop, an internet connection, and the right software has access to the means to design and produce high-quality architecture, and the missing steps of finding a contractor or an engineer are but a website’s click away.

Atkinsons predicts that designers and the architect will become an agent of design, “with the audience of end users selecting which [architecture] system they wish to employ.” What will change as users transition from passive consumers to originators of their architecture? What will separate the professional from the amateur? Architects will have to step away from the design of the product. They will have to learn to become monitors, offering services rather than products. They will have to learn how to co-author, and co-develop entire systems that will be shared by others. They will have to help educate and train just as much as they will become students to the process itself. It is a blessing in disguise, because this reshuffling is liberating. Architects can abandon the design of the end product. They can be free from balancing obsessions of aesthetics and theoretical schools with client demands, and they will enter into the design of complex processes of production, processes that reflect an inherent meta-design, the architecture of architecture, the systems manager and assembler of the processes around us. This thesis project attempts to address precisely this shift from architecture to the arrangement of complex processes, and it hopes to offer an alternative approach to “doing architecture,” one more suited for the shape of the things to come.

The design manifestations of this research project have taken many shapes over the last year, and it is important to see this project as both a process for design and a product of this process. It started with the desire to create an app: an online platform of networked individuals who were enthusiastic about architectural open design. The design of an app would address the current shift toward virtual space in our daily physical interactions, and it would offer an opportunity to closely engage with ways of designing in the open source framework. It transformed into the need of a physical location, where a built project could take place within a cultural and environmental context. The site chosen is Georgia Court, the area in which I currently live, in Northside, Cincinnati, parallel to Virginia and Kirby Avenues, and intersecting Bruce Avenue. Hamilton Avenue, the main arterial and business strip in Northside, is two blocks away, and several bus routes (#17, #19, and #27 all servicing downtown Cincinnati) run in close proximity. This site was chosen because it offered a unique cul-de-sac formation that is rare to Northside. This chosen typology could hint at Fourierist communities: an early representation of the live-work situation, and one that is somewhat indigenous to Ohio (a Fourierist phalanstère was established in 1844 in Utopia, Ohio, located in Clermont County). In addition, the dead-end street offered protected pedestrian activity that encouraged informal run-ins, and this block also displayed dramatic mixed demographics and a sweeping historical context. The variety at this site included one of the oldest houses in Northside, with a three-acre yard, and several atypical small apartment buildings from the 50s. Furthermore involved neighbors already displaying properties of product service systems, redistribution markets, and collaborative lifestyles surrounded this residential block. Neighbors on Georgia Ct. were offering bike repair, and tool lending. A hairstylist was doing haircuts from home, and a fashion designer was using a spare room for design and alterations. Another neighbor had turned their basement into a DIY punk music venue, and others were offering their cars and pick-up trucks for neighborhood use. With these resources the thesis project demanded a way to connect these neighbors closer and make their interactions more efficient and visible. My interest in the design of an app was still appropriate and foremost in my direction forward after the first semester of design and research.

Through conversation and a public block party, encouragement in this open source behavior spawned another neighbor to create a band rehearsal space in his garage, and another to have monthly get-togethers to discuss issues and concerns. These collaborative lifestyles wove themselves further into the thesis, and as several of these homeowners were doing renovations, the idea of creating a neighborhood
A forum for sharing resources about electricians, plumbers, and contractors emerged. During these meetings, several of the neighbors spoke about their frustration with contractors and the bureaucratic nightmare of repairs and remodeling. Utilizing an app that could make this information more accessible, and could host reviews of these resources seemed vital. The opportunity for people to post their bid and proposal online for further scrutiny and peer review would stimulate competition amongst local contractors and fuel business in the area. In addition, the idea of having an online catalogue of excess materials and local services applied even further to this entrepreneurial spirit, and connected closely to my growing interest in DIY kit houses and open source design platforms that could offer easy to assemble low cost options.

Several months ago I engaged in a survey with the neighbors, asking them for personal information about their work background, and probing into the history of their home, and available resident information in order to create the beginnings of a user and a home profile for the app design. Several questions on the survey asked about available resources and the interest in creating more exchange services within the neighborhood. The results showed a growing interest in this programmatic use from both renters and owners. A high percentage was interested in ways of subsidizing income, and showed enthusiasm in options like clothing swaps, and a more formal space for trading and bartering became popular. The idea of a permanent yard sale took hold and is currently in development. The surveys also showed a deep interest in a garden share program, where neighbors could rent out plots of land from those with bigger yards, and could work together to grow and sell seasonal vegetables. Currently three of the ten houses on this block have substantial gardening plots and have moved forward in making this possible. Similarly, they were also interested in possible ways to organize a carpool service, or even a Zipcar style rental.
car arrangement amongst them. Finally the survey asked if people would be interested in having spare rooms rented out as an Airbnb offering for guests and visiting family members during certain holidays or specials occasions. To my surprise it appealed to most of them, and this options is being developed physically at 4329 Kirby Road. The information from this survey was used to further develop the app, and discover what sort of uses and programs would be made available to users.

In January 2013, the Kirby Road School, a vacant public school on the intersection of Kirby and Bruce was auctioned to the public, and the company that purchased it released a statement announcing that they would be turning the school into a group of condominiums and apartment units, both to rent and own. The idea that a vacant building would soon be bringing thirty to fifty new neighbors to the area, expanded the thesis project to discuss how this large campus could be broken up for public use, and better address small business ideas. In addition, this site could potentially host the parking infrastructure and serve as the community-sponsored workshop, where neighbors would pay a small monthly fee to have space and access to tools for making things (similar to TechShop discussed in the previous chapters). If the Kirby Road School and its exterior classroom compartments could be programmed to be the local hardware store servicing this new open source construction industry, then the thesis project could shift to emphasize the open source design and fabrication of additions and renovation projects and integrate the entrepreneurial spirit present in the neighborhood. The neighborhood, through this thesis project, would become an alternative Main Street as homes and apartment units would create temporary storefronts, essentially turning this block into a second Hamilton Avenue Business District.

After the surveys were conducted I built a large-scale neighborhood model out of insulation foam using a 3-axis CNC mill through the University of Cincinnati’s Rapid Prototyping Center. This model contained complete topographical features, and after sanding and sealing the surface I painted it with black chalkboard paint, so that neighbors could write and draw without fear of permanency. During the next block party we gathered around the model, drew ideas, and potential locations for the neighborhood projects and then we photographed and erased the surface. The more iterations we did, the more ideas flowed between neighbors, and the less serious they took themselves. This proved to be a significant strategy in commoning the architectural design process.

After the chalkboard model and several iterations were complete, I began working closer with the residents at 4329 Kirby Avenue in redesigning their basement and garage spaces. The owners wanted to create an Airbnb establishment in the basement, to subsidize income and to eventually find a long term renter. After measuring the basement with MagicPlan and verifying it with a tape measure, I used photographs and compiled a 3D model of the basement with SketchUp, a free and open source modeling program. I then printed out these images and sat with them with trace paper in hand to discuss how we could better arrange their basement to fulfill their needs. We surveyed design precedents online and we introduced each
other to a variety of websites with relevant information. After several iterations they contacted a local contractor and plumber to discuss the details. The contractor went ahead and told the owners what sort of demolition work needed to be conducted before a proposal and bid could be agreed on. Over the months of February and March, I volunteered my time removing walls, dry wall, and old insulation. We used the drawings we had to submit to the contractor and a bid for $15,400 was agreed upon, including high-priced items like radiant heating and cooling. We were unable to verify the accuracy of this proposal with other contractors, but have negotiated with the contractor to lower the fee by exchanging access to garage space on the property. Work has progressed, and the bathroom design, bedroom and closet design from our original SketchUp model is being built, and process photos will be posted in the weeks to come.

After this experience, they invited me to help them remodel a two-storey garage. The top floor would serve as a community center and gathering space until funds were collected to turn it into a loft. Adjacent to this space would be the existing band rehearsal space. And the lower floor would become a workshop and mechanic tinkering space. For the time being, I used this site to generate the plan for a community center and workshop that would fulfill the requirements for a thesis on open source design and fabrication, since the scale and scope of the Kirby Road School was dismissed as access to the property became forbidden. In addition, Dennis at 4327 Georgia Court has allowed me to measure and model his house and property and propose a neighborhood hackerspace, and a temporary lending library from an open source house kit offered through WikiHouse. This site would serve as the “permanent yard sale.” Because of increased neighborhood interest, I decided to create elevations for every house on the block, and send it to the neighbors so they could draw and design what sort of renovations or exterior additions they would like if this open source neighborhood was to exist as planned for the thesis. As of yet, these elevations have not been returned to me, but design work continues utilizing this information as examples in the proposed neighborhood website.

These sorts of issues and interactions became the driver of the thesis, and an entire social network site dedicated to online and offline participation revolving around shared resources and exchanged information that emphasized entrepreneurial opportunities has emerged. The work shown here is far from completion, and the design process that has materialized is a window into this small and substantial group of enthusiastic neighbors.
4322 Georgia Ct.  
1824 Bruce Ave.

15  
West Elevation: NS

16  
East Elevation: NS

17  
North Elevation: NS
SITE_NORTHSIDE, CINCINNATI, OH_KIRBY + BRUCE + GEORGIA CT.

1. Nodes + Connections

2. Bldg Mass + Site Area

3. Topography
### Case Studies

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### Design Guidelines

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### Objectives

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### Notes

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- [Additional information]

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[Image of page layout with tables and diagrams]

55
SITE _MODEL_ 1:500 LASERCUT 2-PLY CHIPBOARD WAFFLE CUT INTERSECTIONS IN PROGRESS

1. WEST ELEVATION
2. EAST ELEVATION
3. SOUTH ELEVATION
4. NORTH ELEVATION
5. AERIAL
6. AXONOMETRIC PERSPECTIVE
Hackerspace in Construction

Dennis’s Hackerspace @ 4327 Georgia Ct.
Neighborhood TechShop: Existing

Neighborhood TechShop @ 4329 Kirby Road
Airbnb site: Existing

Airbnb listing @ 4329 Kirby Road
Open Source Neighborhood: App Preview / Design Post Page
Open Source Neighborhood Platform: My Neighborhood Page

Open Source Neighborhood Platform: User Page
Open Source Neighborhood: Website Plan
OPEN HOUSE
STUDIO-X, DILLER SCOFIDO + RENFRO, DROOG

Date: Saturday, April 23, 2011
Location: New York & Levittown
Text from www.openhouse2011.com

Washing machines sit idle most of the time. Homes offer views that mostly go unnoticed. At the same time, housing foreclosures are on the rise and ready-made jobs are not easy to find. Inspired by the service-oriented mentality of New York, Open house by Droog in collaboration with Diller Scofidio + Renfro is a movement in which suburban homeowners supplement their income and develop a new vocation by offering home-made services and facilities to the public.

Open house encourages self-inventiveness, offers ideas, and proposes new models for suburban housing, striking a new balance between the private and public realm. Starting with an economic argument for the struggling middle class, the proposal also addresses the challenges posed by urban sprawl and single-owner consumption. The new residential marketplace not only brings more capital and density to the neighborhood, it also increases social cohesion through service exchange.

Open house took place as a one-day event on Saturday, April 23rd, 2011. The event was kicked-off with a symposium at Studio-X New York introduced and moderated by Mark Wasiuta of Columbia University, followed by a bus trip to Levittown, where visitors could view and participate in nine house installations in the neighborhood, designed and executed by architects, designers and artists in collaboration with the homeowners. One of the installations showcased concepts for future open houses, with proposals for new housing configurations and regulatory modifications.

Symposium, Studio-X New York
The symposium at Studio-X was introduced and moderated by Mark Wasiuta (Columbia University), and featured presentations by Renny Ramakers (co-founder and director of Droog), Charles Renfro (project lead designer and partner at Diller Scofidio + Renfro), Heleen Mees (author on New York service economy), Roo Rogers (co-author of ‘What’s mine is yours’) and Mary Ellen Carroll (artist).

House installations, Levittown
Buses took visitors to Levittown, where they could view and participate in nine house installations in the neighborhood. Lunch was provided on the bus.

REFERENCES

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http://www.openhouse2011.com/
ADDITIONS TO EXISTING HOUSES

1
Extended Living + Dining

2
Dog Sitting and Backyard Walking

3
Library

4
Love Hotel

NEIGHBORHOOD NETWORK
EXYZT’s manifesto proclaims it as a ‘platform for multidisciplinary creation’ whose aim is to challenge the view of architecture as an independent field of practice. Instead, they embark on experimental living ventures built collectively. The collective conceive and organise each project as a playground in which cultural behaviors and shared stories relate, mix and mingle. Each project, always strive to involve different constituencies of the local community in a social network that is invited to inhabit a temporary space.

We want to build new worlds where fiction is reality and games are new rules for democracy. If space is made by dynamics of exchange, then everybody can be the architects of our world and encourage creativity, reflection and to renew social behaviors. Architecture can expand into a multidisciplinary game where everyone brings his own tools and knowledge to contribute to a collective piece. We do refuse to enter the current architectural practice which serve the building industry. We do deal with the reality of construction. We design, build and live our constructions and host the freedom for visitors to appropriate our projects. We produce an open source architecture that offer an access to basic public amenities and a place for exchange : A physical framework for a direct and immediate emulation between people and space. We wish to incite anyone to re appropriate and get involved with his own social and physical environment.

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http://www.exyzt.org/
Santiago Cirugeda’s practice is born of the frustration that as an artist or an architect it is quite easy to transform the space of the city through obtaining permits for installations and temporary interventions, yet as a citizen it is almost impossible to take action to improve your own environment. His work questions what it is to be an architect in this context and he tries to empower citizens to act in their own locality by showing how it is possible to subvert laws, regulations, and conventions. His work is about the possibility for action, appropriation, occupation and use, where the citizen can act as initiator, using the guidelines and instructions set out by Cirugeda to build, display or create space. Cirugeda’s practice questions the notion of the architect as sole author-designer. His is an open-source architecture conceived as a tool kit or a user guide, distributed freely through his website Recetas Urbanas or ‘Urban Prescriptions’. His antidotes to capitalist and commodified space are available here for anyone to replicate. Cirugeda describes his practice as ‘an urban and social renovation’, making an architecture that is cheap and available to all.

A substantial part of the studio’s work so far has tackled those sites in cities that have been left over by demolition, lying empty or walled in—unusable for reasons of active neglect, lack of care or abandonment. One suggested action gives specific advice on how to apply to the local council for a permit to install something temporarily. This ‘something’ is, however, never to be taken literally, but acts as a mask for alternative actions. In the project ‘Public Domain Occupation with Skips’, the structure merely resembles a skip but is in fact a vehicle for citizens to occupy the urban realm through ‘taking the street’. Another proposal applies for a permit to erect scaffolding for re-painting the façade of a building, but instead creates an enclosed space in a scaffold-type structure that can be used as a temporary extension or simply as a semi outdoor space; Cirugeda calls these pockets, ‘urban reserves’.

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**WikiHouse**

Date: 2003-present  
Location: London

WikiHouse is an open source construction set. Its aim is to allow anyone to design, download, and “print” CNC-milled houses and components, which can be assembled with minimal formal skill or training. It is licensed under the **GNU General Public License**.

Online templates are available for use and modification and by using freeware such as SketchUp, 3D models are downloadable and free plug-ins allow for the design to be exported for .svg reading for CNC fabricators.

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http://www.architecture00.net/blog/
The OS (OpenStructures) project explores the possibility of a modular construction model where everyone designs for everyone on the basis of one shared geometrical grid. It initiates a kind of collaborative Meccano to which everybody can contribute parts, components and structures.

Within current hardware constructions we observe the existence of various closed systems. Although all these systems enjoy the benefits of modularity within their system, they most of the time are completely incompatible with one another. Within software constructions however we are witnessing the emergence of open modular systems. The OS project tries to find out what happens if we would initiate an open modular system for hardware where different entities design different parts and components but all according to one shared modular grid.

The ultimate goal is to initiate a universal, collaborative puzzle that allows the broadest range of people - from craftsman to multinationals - to design, build, and exchange the broadest range of modular components, resulting in a more flexible and scalable built environment.

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01_THE CATHEDRAL AND THE AGORA


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02_COMMONS-BASED PEER PRODUCTION


03_COLLABORATIVE CONSUMPTION


04_SYSTEMS CREATE STRUCTURES


05_OPEN SOURCE ARCHITECTURE


01. _THE CATHEDRAL AND THE AGORA_


02. _COMMONS-BASED PEER PRODUCTION_


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17 Self-Built Skyscraper: Torre David. http://www.today.it/~media/big-square/68385342763746/torre-david-caracas-7-2.jpg


14 05_OPEN SOURCE ARCHITECTURE


15 05_BUILT STUDIO PROJECT

1 The hand of the architect then. Le Corbusier’s hand over Ville Radieuse: http://www.phillyhistory.org/blog/wp-content/uploads/2012/04/img-3.jpg

2 The hand of the architect now: online. Photocollage by author.

3 The hand of the architect now: online. Photocollage by author.

4 Diagram of existing conditions: November 12, 2012. Photo by author.

5 Neighborhood survey with door hangers and tags. Photo by author.

6 "I wish this was ..." tags from Candy Chang’s website: http://iwishthiswas.cc/

7 "Please Disturb!" Doorknob Hanger on 4331 Georgia Court. Photo by author.

8 "Can I Borrow?" Doorknob Hanger on 4329 Kirby Rd. Photo by author.

9 1:500 Scale Black Chalkboard Model. Photo by author.

10 Neighborhood electrician and contractor. Photo by author.

11 Lower floor of garage @ 4329 Kirby Rd. Existing Conditions. Photo by author.

12 Interior of lower floor of garage @ 4329 Kirby Rd. Photo by author.

13 Upper floor of garage @ 4329 Kirby Rd. Photo by author.

14 Upper floor of garage: loft space @ 4329 Kirby Rd. Photo by author.

15 West Elevation of Georgia Ct. Image by author.

16 East Elevation of Georgia Ct. Image by author.

17 North Elevation of Georgia Ct. Image by author.

18 Dennis’s Hackerspace in Construction. Image by author.

19 Dennis’s Hackerspace @ 4327 Georgia Ct. Image by author.

20 Neighborhood TechShop: Existing. Image by author.

21 Neighborhood TechShop @ 4329 Kirby Rd. Image by author.

22 Airbnb Site: Existing Conditions @ 4329 Kirby Rd. Image by author.

23 Airbnb listing @ 4329 Kirby Rd. Image by author.


28 Open Source Neighborhood: Design Download Profile. Image by author.
Open Source Architecture is an architecture of full disclosure.

It defines itself as a communicative instrument for improving relationships between inhabitants by sponsoring free access and availability to the tools of its construction.

Open Source Architecture explores the adjacencies between online and offline platforms.

It leaves behind the individual consumer and their monolithic target market and sets off to explore the end-user and Sterling’s “wrangler” who shares ideas and antagonistic concerns and lives and breathes them into their participation in the design process.

It builds on the participatory design of de Carlo, the anti-authoritarian view of Rudofsky, the escapism of Cedric Price’s “Non-Plan,” and Friedman’s Ville Spatiale to question the formation processes of the public sphere and the implementation of participation within it.

It is stripped of technical and bureaucratic restraints, and seeks an architecture that follows Robert H. Waterman’s definition of adhocracy, whereby architecture “cuts across normal bureaucratic lines to capture opportunities, solve problems, and get results.”

It is based on simple repeatable forms of construction and assembly and is an open, continuously adaptable process of self-organization and assessment.

It values the cleverness and innovation of tinkerers and hackers over professionals and specialists in the field.

It is an architecture that adapts existing designs to new users, and combines traditional knowledge and techniques with new tools and technologies.

It recognizes Sennet’s assessment that people who participate in open source computer software are the ideal craftsman, the Haphaestus for the new gods.

It is chaotic and flexible, and organizes space through the adaptation of the concrete, everyday needs of its inhabitants.

It is a user-driven approach where addition, subtraction, variation, and repair is preferred and where top-down replacement is avoided.

It is an architecture that starts with post-occupancy evaluation.

Open Source Architecture embraces the current economic and political crises, and presents alternative forms of economic trade with confidence in new digital networks of intervention.

It ensures primary importance on a continuity of relationships in question, of an endless process in continuous negotiation and transformation; embracing imperfection and striving for innovation and self-expression in constant flux.

It is an architecture of mixed authorship, of collaborative physical and online networks that borrow and lend intellectual property through new ethics of consumption. It is this shared immaterial that provides the foundation of its construction and ensures its negotiation in the public sphere.

It takes existing resources and raw materials and fashions them for a social purpose, conceiving of a structure that accords with their qualities. Thus it is an architecture of the Internet, and the immateriality of social networks.

It empowers society and embraces a maker culture, a “third industrial revolution” where an irrepressible flow of knowledge has precipitated a new social and political revolution that hopes to follow Ivan Illich’s message by “invert[ing] the present deep structure of tools [in order to] give people tools that guarantee their right to work with independent efficiency.”

It recognizes the increase of liability and avoids stratified responsibilities. It reveals professional secrecy. It negates the divide between expert and user, and leverages the power of participation.

It does not subscribe to the romantic conception of democracy, populism, and participatory design in architecture; instead, it equips itself with conflict, disagreement, and negotiation as its tools in the design process.

It is a politically active architecture that prioritizes problem finding over problem solving.

It is an architecture that generates processes, not the production of objects.

It looks to new forms of production and is structured around the same collaborative, peer-to-peer distribution networks that form the basis of information industries.

It is not an architecture without architects, nor one of anonymity. Rather it is an architecture where participants subsume the architect.

It is an architecture that avoids the hegemony of the profession, and the incestuous nature and importance of an end-product and liberates architecture.

It is an architecture of Giancarlo de Carlo, “that is too important to be left to architects.”