

# Free Sources or Why Production No Longer Worries Us

Christian Siefkes

*Originally published in German in the collection “Etwas fehlt” – Utopie, Kritik und Glücksversprechen edited by the jour fixe initiative berlin (edition assemblage, Münster, 2013, pages 255–272).*

*Online: <http://keimform.de/2013/free-sources-1/>*

## Kitchen Fabrication

We produce in the kitchen or in the bathroom. Most people have some fabrication bots at home. The popular 3D printer/mill combines a 3D printer with a computer-controlled milling machine. 3D printers produce three-dimensional objects by printing multiple layers of bioplastics, metal, or ceramic on top of each other, until the desired object is complete. Within several hours, typical home 3D printers can print objects up to 50 by 40 by 30 centimeters large. That’s big enough to print most durable households items, whether crockery, cutlery, games and toys, or tools. Electrical and electronic appliances are made in the same way, except for the actual electric or lighting elements. It’s also common to print replacement parts if something breaks down or doesn’t fit.

Furniture and other big things are assembled from parts that can be made separately. Frequently, they are partially composed of prefabricated plates or beams in order to save production time. Computer-controlled (CNC) mills cut plates to size and insert openings and cavities. They can also engrave inscriptions or images.

3D printing uses less energy than most older manufacturing processes, since it only heats the used material for a short time in order to melt it. (To prepare the typically used bioplastics for printing, they must be extruded into filament and rolled onto a spool, but this preprocessing step doesn’t take much energy either.) All the used material becomes part of the finished product, nothing is wasted or required for molds or other special tooling. Milling is more wasteful, as parts of the material are removed. But it’s usually possible to re-use removed material. Since the basic setup of 3D printers and milling machines is similar, both are often combined in a single unit in order to save space.

People who want to make something, whether for personal use or as a gift, search online for suitable designs. The widespread “thing-get” program knows almost all the designs out there and offers multiple options for searching, by keyword or by criteria such as material, size, popularity. All designs are free source: everybody has the right to use them, to modify them as desired, and to share them with others (in original or modified form). Most designs are parametric: you can adjust parameters that control size, used materials, color, and other

properties of the defined object. This further improves the chances of finding something among the huge mass of shared designs, and turning it into a thing that suits your needs.

If you don't find anything appropriate for your needs, it's usually at least possible to find a design that makes a suitable starting point for further adaption. Often you will also find other people that help you create your own variant, either online or in a decenter near you. Others who join forces may be driven by the desire to get such a thing for themselves, or they may just enjoy the challenge or look for something useful to do. Most designs thus become collective creations, just like software and other intellectual works. Once a new or improved variant is ready, you share it to allow others to benefit too.

Strange as it seems, the household was once considered an unproductive realm, limited to family life and so-called reproductive chores such as cooking and cleaning, child and elder care. These chores were often imposed upon women, while the men relaxed on the sofa, or took refuge in the factory or office. How unfair and bizarre!

These days, most cleaning is done by household robots that slowly crawl and climb through all rooms, freeing all surfaces of dust, dirt and germs. Meals are often pre-cooked. You just heat them up, flavoring them as you prefer and enriching them with sauces and other refinements as you like. Everyone takes care of the children and the elderly as necessary. That's a matter of general concern, not restricted to a specific household or special institutions as in the past. In these segregated institutions (known as "kindergartens," "schools," or "retirement homes"), children were apparently isolated for hours and the elderly even for years and years. They were cut off almost completely from general life, interacting only with their peers and with professional caregivers.

Today, old people live everywhere. Younger residents take care of them as necessary. That's a responsibility of the whole community, not of specific individuals. After all, everyone needs care sooner or later, and people like staying in their accustomed neighborhood and with their friends when that happens. Looking after children is also a community affair, done by parents, neighbors, and older children. Older children and adults bring the young ones into their projects where they can learn on the spot. Often there are mentors who take care of any newcomers, whether adults that want to get involved or curious children.

There are also **learning hubs** where people come together in order to learn and improve their skills. They are nothing like the schools of earlier times, where children were forced to engage with topics they couldn't choose. Learning hubs are frequented by people of all ages, dealing with anything that interests them. Motivation is one of the most important factors for successful learning. Hence it must be voluntary or it is pointless, though apparently the people who once ran the schools didn't really understand that. They seem to have believed that children wouldn't learn to write and do math unless forced to do so. And yet, children have always learned to speak, without needing coercion, though that is certainly not easier!

## Garden Farms and Decenters

Growing food is just one of the purposes of **garden farms**. People used to distinguish gardens and parks meant for recreation and beauty from farms dedicated to agriculture and animal husbandry. Garden farms are both. They provide food and renewable resources. At the same time, they are places of recreation and relaxation, open to everyone. Fields, flower beds, and pastures are interwoven with areas for playing, picnicking, or bathing.

Lots of different cultivation practices are used, since each project chooses their preferred style. Many use permaculture or approaches aimed at providing high yields even on small areas, such as the biointensive method and hugelkultur. Also widespread is hydroponics, the cultivation of plants in a nutrient solution instead of organic soil. Hydroponics provides high yields at little effort. It is often combined with fish farming in tanks or open ponds. This variant is known as aquaponics. Since the plant beds are regularly watered with the nutrient-rich water from the fish tanks, no nutrient solution is needed.

Garden farms use the pub/sub method to distribute their produce. They announce (“publish”) what they intend to produce. People decide which of the offers of nearby garden farms suits their tastes. They let the chosen farm know that they wish to regularly receive a portion of their produce (“subscribe”). Then the garden farm caters for them as long as it is active, or until they change their mind. Most farms let people customize their subscription by specifying which stuff they cannot or don’t want to eat (many people don’t eat meat) and what they like most. If you need more, because you have visitors or want to throw a party, it’s best to let the garden farm know some days in advance so they can adjust your portion. Likewise when you need less or nothing for some time, say because of traveling.

Based on the subscriptions each garden farm can assess the demand and produce accordingly. If a farm gets more subscriptions than they can fulfill, they may take over some nearby unused land and increase their output. If no additional land is available or they don’t want to expand, they refer the potential subscribers to nearby farms.

Most garden farms have cooking/baking facilities on their premises. There they bake bread, prepare jams and other spreads, and pre-cook meals. All farms are part of the **GardenNet** coordinating the global sharing of plants that only grow in certain climates. Each farm registers their need for plants that only grow elsewhere. The farms situated in suitable climates informally distribute these additional demands among themselves, each producing a bit more than they need for themselves. This global giving and taking is the most convenient solution for all. Everyone has access to produce from other climates, without the additional effort it would take to grow them locally in greenhouses (though that happens as well). The GardenNet also takes care of local shortages or surpluses.

The various places known as **decenters** or **hubs** also play an important role in our re/production. They, too, are based on the right to copy and modify. All decenters document what they do and how they do it, thus allowing people elsewhere to learn from their practices and to adapt them to their own needs. There are many kinds of decenters – learning and research hubs, health and care hubs, vitamin factories, fab hubs, community cafes, and more. All run by volunteers who join forces in order to organize and operate them.

**Learning** and **research hubs** can often be found together. They are places for learning, research and exploration. **Health hubs** treat people who are ill or had an accident. They have specialists who can perform surgery, treat your teeth or your eyesight, or help with childbirth. **Care hubs** are dedicated to body care and to physical and mental well-being. There you can get a massage or your hair cut. Most care hubs have teams of mobile caregivers who look after old or ill people that need special support. Health hubs have rescue teams that provide first aid in emergencies.

**Vitamin factories** have nothing to do with food (that’s what garden farms are for). “Vitamins” here mean any parts needed for kitchen fabrication or fab hubs that are unsuitable for decentralized production. For example, electrical and electronic components such as motors, LEDs, and microchips. Until some years ago, the fabrication of microchips (the core of any computer) required huge semiconductor fabs. These were so complex to build and

run that only a few dozen existed worldwide. Some people feared that the projects running the fabs might become too powerful. They feared they could conspire and blackmail the rest of the world by threatening to cut everybody off from access to chips, the basis of all modern communication and production equipment. These worries were unfounded, if only because the fab operators themselves were far too dependent on garden farms and other projects. They could never have risked turning against everybody else. Nor was it ever quite clear in which ways they could have benefited from such blackmail.

Meanwhile, printed electronics has advanced sufficiently to efficiently manufacture electronics of all kinds, even microchips. Electronics printers are similar to inkjet printers, but their resolution is much higher and they print liquefied electronic materials (such as conductive polymers, silver particles, and carbon) instead of ink. For complex components, multiple layers are printed on top of each other. Such printers can be found in most fab hubs, hence the super-specialized semiconductor fabs are being phased out.

**Fab hubs** complement the kitchen fabrication with machines that are larger and more versatile than the equipment you typically have at home. They are open to everybody living nearby. Typical equipment includes some big and fast CNC mills and 3D printers as well as a laser cutter. Laser cutters use a strong laser beam to cut metal, wood, plastics, or stone; they can also engrave arbitrary pictures or text. Fab hubs also host equipment for printing electronics and pick-and-place machines for the automatic placement and soldering of electronic components on printed circuit boards (PCBs, made on a CNC mill).

They also tend to have equipment for making clothing and other textiles, especially knitting and sewing machines. CNC knitting machines create fabrics in any desired shape and arbitrary patterns, thanks to the Jacquard technique (invented at the begin of capitalist industrialization). The parts are then stitched together by an automatic sewing machine. Some people have smaller versions of these machines at home, but most use the machines in a nearby fab hub.

## Stigmergic Self-selection

No garden farm and no decenter could exist without a team of people who care about the place and keep it running. These teams find together via self-selection. Everybody decides according to their own preferences, whether, where, and how they engage. These decisions are influenced by hints left by others, pointing to unfinished or desired activities. Hubs and farms collect their open issues in public wish lists. The users of the place, but also everybody else, may decide to start working on some of these tasks. Some do so because they enjoy it, others in order to learn how to do it. Others become active to resolve some fault that affects them, say if a nearby fab hub lacks machines they would like to use or if their garden farm stopped making jam.

Many people start as users of a place and become contributors later. Some contribute for just a few hours, others occasionally from time to time, still others become regular contributors, say because they grow fond of the project, the tasks, or the other people involved. But not only users become contributors. The popular “task-list” software gathers all tasks shared by projects all over the world. It makes it easy to search for activities one is interested in, allowing to filter them by regions, kinds of task, kinds of project, or arbitrary freetext queries.

This decentralized task distribution mechanism is known as “stigmergy,” from the Greek word *stigma*, meaning “mark” or “hint.” Stigmergy also exists in the animal world. Ants and termites organize themselves in this way. But while insects act instinctively, the stigmergic self-organization of humanity is based on millions of conscious decisions. Everyone takes their own needs, wishes, and skills into account when deciding which hints to leave and which to follow. This causes a distributed prioritization of open tasks: things about that many people care a little, or some people a lot, are handled sooner than things that leave everybody cold. And because people choose for themselves where and how to engage, everybody is motivated and all the manifold talents and skills come to their full potential.

Of course, that’s only true as long as everybody can freely choose their occupations based on their individual preferences and strengths, unconstrained by social expectations or the lack of learning opportunities. In the past, many people believed that women were generally better at some tasks and men at others. Such stereotypes were self-reinforcing since they discouraged women from engaging in “men’s activities,” and vice versa. And also because those who ignored the stereotypes had bigger obstacles to overcome before being taken seriously. Today we take care to nullify such stereotypes if they still occur, allowing everyone to learn about and engage in whatever areas and tasks they choose.

People once seem to have thought that coercion was a necessary element of any society. They apparently believed that otherwise nobody would do things that are useful to others. Coercion was practiced in various forms, most frequently in the form of “money.” Money was similar to the chips we use in some games. But then it was not a game, it was necessary for survival. For most people, working was the only way to get it. Unless you had enough money chips, most or all socially produced wealth was closed off to you. It sounds incredible, but many people even died of hunger just because they lacked money!

Today we no longer worry about people not working unless forced. For most activities, it’s quite easy to find enough volunteers. When that’s not the case, it’s usually for things that not too many people consider important. That tends to happen with vague ideas that don’t inspire people, or with hobby projects pursued by just a handful of people that fail to spread the idea. In such cases, the people who do care need to find a way of managing without much additional support, or just give up. This can be quite annoying if you put a lot of energy into something that doesn’t take off, but it doesn’t cause any serious harm.

If things are important they hardly lack volunteers. It helps that there is so much we can leave to the machines. This trend started earlier, in capitalism. At that time, it was an ambivalent development, since people had to work in order to make money, and if machines took over their work, their access to money was cut off. This problem doesn’t exist any more, hence we automate even more. If there aren’t enough volunteers for a task (something that happened more frequently in the past), a team of automation enablers will usually be around quickly. They’ll explore options for re-organizing the task in such a way that all or parts of it can be handled by computer-controlled machines. Often, it’s enough to eliminate hazardous, boring, smelly or otherwise unpleasant aspects of a task in order to make it sufficiently attractive for volunteers.

Society has also become much more efficient, further reducing the volume of necessary work. In capitalism, everybody’s goal was to get more money, rather than producing the needed things as efficiently as possible. Getting money was a kind of race, you had to outdo others which tried to outdo you. The worse the others did, the better for you. Today we share knowledge, software, and innovations, since this is better for everyone and since others will often contribute further enhancements. Back then, everybody tried to keep their knowledge

secret and to prevent others from using it, in order to finish the race before them. That caused an awful lot of additional work and inefficiencies.

Moreover, companies tried to convince people that they really needed the stuff produced by the company, in order to get more money. (Companies were somewhat similar to projects, but organized in a totally different manner.) And when things broke down, or sometimes even earlier, they were often simply discarded and replaced by new ones. Today we prefer modularity: if a part breaks down or no longer fits your needs, you just adapt or replace that specific part.

That work was organized by companies rather than projects must have been another reason why people couldn't imagine a world without coercion. Companies had leaders who told people what to do, and everybody working there had to follow their orders. This strange arrangement was obviously fatal for motivation. If you were lucky, you might have been able to move from one company to another, but there you would be again in the same situation.

Nowadays, projects strive for "rough consensus and running code," simply as a consequence of their organizing volunteers. They cannot force anyone to contribute, nor can they bribe people with money. Often there is a maintainer or a team of them – they might have founded the project or were chosen by election or co-option. While they coordinate the whole thing, they always have to make sure that important decisions are accepted by most of the people involved. And that means not just the active contributors, but the users too. Without this rough consensus, no project will get very far because they won't find enough volunteers. The second goal – produce "running code" – makes it easier to structure the debates. The objective is finding solutions that work well in practice, not just making arbitrary decisions based on individual taste.

Formerly, people also seem to have disliked work because they had too much of it. Apparently they utterly failed at distributing work in a reasonable manner. Some people had no work and hence no money, others had too much work and hence not enough time for everything else. Today, all of us have enough leisure, for dozing, sleeping, playing, reading, making love, doing research, watching movies, going for a swim, sunbathing, or whatever else we fancy. That's nice, but for most people, it's not enough. They also want to do something useful for others, at least on some days or a few hours per day. They want to take part in the reproduction of life. They want to do something for others, for the community, just like others are doing so much for them. They want to learn something or do something that is both enjoyable and useful. Or they get involved in producing something they desire – they "scratch an itch," as Eric Raymond, one of the free-source pioneers, expressed it.

Most successful projects have found ways of making involvement easy. They warmly welcome all newbies and help them when needed. They integrate contributions that make sense and try to help improving those that aren't quite there yet. That's why re/production works without requiring coercion. Sometimes there still are problems, of course, but when that happens, we talk about it and try to find ways of dealing with the situation.

When tasks can't be distributed via stigmergic self-selection alone, many communities and some projects fall back to "white lists." Anyone can anonymously add a task to these lists, say if it often stays undone because of a lack of volunteers, or if the volunteers working on it are unhappy. This can be a problem since, while nobody is forced to start working on any specific tasks, once you have done so, not everybody finds it easy to give them up later. You might fear to disappoint others or leave a painful gap.

The listed tasks are discussed in weekly or monthly meetings. Tasks can be taken off the list if most people agree that they are no longer problematic. The remaining tasks are

then distributed “round robin”: everybody should do some of them from time to time so they won’t cause much trouble to anybody. Often, lots are drawn to assign people to tasks for specific time periods. There are no direct sanctions for refusing to take part in the round-robin distribution, but it almost never happens.

It’s more tricky when unpopular tasks require special skills that not everybody can learn in a short period of time, but that situation is relatively rare. In any case, the general goal is to keep the white lists as short as possible (ideally, are they completely empty, hence “white”), by automating the problematic tasks or by re-organizing them to make them more attractive. Often this works quite well. In the past, people seemed to be much less happy with the things they had to do than we are now. That was probably also caused by them having few choices of what to do, and not much influence on how exactly to do it. We have.

## Meshes and Routes

Re/production used to be a burden which kept countless people busy for most of their lives. No longer. It has become a relatively easy and mostly pleasant affair, not least because of our reliance on **mesh networks**. Decentralized mesh networks allow everyone to participate. They are organized in ways that avoid asymmetric dependencies and ensure that nobody can acquire a specifically privileged position.

The Internet, precursor of our **Intermesh**, was the first global network which implemented the mesh principle to a high degree. It was a network of many networks, without a privileged center. Whenever a particular route was turned off, the affected message simply took a different way around it. However, it still had some centralized components which were eliminated later – most significantly, the Domain Name System (DNS) which was used to bind the names used in communications to specific computers.

Our energy network is a mesh too. Most garden farms run wind turbines and almost all houses have solar panels or solar-thermal collectors on their roofs (the latter produce electricity and heat in parallel). If the electricity isn’t locally needed, it’s fed into the **Powermesh**. If, on the other hand, you need more energy than locally available, you draw the difference from the Powermesh.

Further building blocks for our decentralized energy supply are the high-performance batteries and supercapacitors placed in most homes. Whenever a house or other place produces more energy than locally needed, there are two options: feed it into the mesh or store it in the local battery. The local control software decides which option to prefer at any given moment, considering the hints it gets from the mesh about energy production elsewhere. If there is a general surplus, the energy should be stored for later; if energy is needed elsewhere, it should be fed into the mesh. Similar decisions are made by the software whenever you need more energy than locally produced: it will be taken either from the mesh or from the local battery, depending on hints about the state of the mesh.

Other energy sources such as geothermal energy and the remaining stocks of natural gas are also used, but sun and wind are the most abundant sources. They tend to complement each other well. Higher wind intensities often go along with clouds and less sunshine, and vice versa. And the sun has the advantage of giving most energy around noon, when demand for energy is highest. Thanks to the distributed mesh control software it’s usually possible to use power near to where it is produced rather than having to transport it over long distances (and losing parts of it in the process). Solar cells can be printed (printed electronics); most

other equipment necessary for energy generation and distribution is made in Fab hubs on 3D printers and CNC mills.

Water distribution follows similar principles. Most garden farms have wells for drawing groundwater and most houses have systems for rainwater collection. The water is filtered and processed locally. The various sources are connected through a mesh of pipelines, allowing access to water from nearby sources whenever necessary. The mesh control software ensures that this happens smoothly and that the water is not transported over longer distances than necessary. It also maintains a sufficiently high pressure in all pipes. Wastewater usually flows to the nearest garden farm, as most have small sewage plants. The resulting sludge is often used as fertilizer, with remainders being burned as power source when this can be done safely.

**Route projects** take care of the transportation infrastructure – power cables, pipes for fresh water and sewage, streets and traffic lines. Usually they are run by self-selected volunteers, like all projects. In some communities, however, their members are selected by lot, due to the essential role these projects have for the local infrastructure. In any case, it is clear that all users of infrastructure are involved in the decision making process and that all decisions require the rough consensus of everybody concerned. That's important because other projects can be forked if necessary: if an agreement cannot be reached or if some people are unhappy with the course of the project, they can leave it and start their own alternative. But for route projects, this is hardly a viable option. The existing routes have to be used, maintained, and where necessary expanded, to avoid wasting time and resources.

For road traffic, electric bicycles and light electric vehicles with three or four wheels are popular. The e-vehicles can drive autonomously on elevated roads marked with colored guide paths. In this way they also transport goods without requiring human intervention. On smaller, ground-level roads, they need a driver who can take control when necessary. All cities have public transportation systems, often gondola lifts (cable cars) which initially became popular in South America ("Metrocable"). The cables holding the gondolas are often mounted below the elevated roads. Long-distance travel most often takes place in maglev trains or other kinds of autonomous high-speed trains. You can leave your e-bike or e-vehicle at the station and pick up another one after reaching your destination.

Sea travel doesn't require physical routes. There are lots of projects that run ships between seaside cities. For long distances, hovercrafts are popular. They are fast, though not quite as fast as the airplanes that existed in the oil-rich past. Today a journey from Lisbon to New York takes about two days, while the Concorde, the fastest airplane of all times, covered that distance in four hours. (Though it was only used for a few decades.) But we have much more leisure than the people of that epoch, and it's fun to dash over the water.

## Resources and Conflicts

Formerly, people had less time, and more worries. Apparently they believed that Earth wasn't big enough to host eight billion people or more. Considering their way of life, that was probably even true, but today we manage well enough. Many of their problems must have been related to the fact that they attached little virtual labels to almost everything, declaring it the "property" of somebody or other. There were innumerable conflicts about who was the actual owner of this or that property. Many people didn't have enough; others had far more than they could ever have used.

Meanwhile we are much more relaxed about such stuff because we know that we can usually get access to the things we need whenever we need them. Meshes provide electricity, water and communication options. When you need medical care, you get it in the nearest health hub or, if necessary, in a specialized medical hub. To improve our skills we have learning hubs. Transportation is free for all. Food and other essential goods are provided by garden farms and fab hubs, and lots of useful items can be 3D-fabricated at home. The required constituents (such as plastic filament for 3D printers, wooden and metal plates for CNC mills, yarn for knitting and weaving machines) come from **refeeding projects**. They also handle the collection and recycling of waste.

In case of shortages, allocation follows the round-robin principle. Elemental needs are taken care of first. For other desires you may have to wait same time. Anyone who feels treated unfairly can complain to the local conflict council. Luckily, shortages and complaints tend to be rare. It certainly helps that we always aim to make the most of whatever's there. Formerly people had lots of electronic devices for various purposes, all of which had a computer as their core. Nowadays, everybody tends to carry a single Turing box around, which can be turned into a phone, camera, navigation device, audio player, e-book reader, tablet, fully-fledged laptop, or any combination thereof, just by mounting the chosen I/O components. Most people keep a second Turing box at home, used as desktop computer, Intermesh server, media center and for controlling the machines in the home. That's enough; it's flexible and spares you from carrying unnecessary ballast around.

Every community has a **resource council** that tracks which resources – land, housing, natural resources – are in use and which are available. If you need something, say a home, or rooms or land for a project, you query the resource council for what's available and pick something that suits your needs. If you stop using a resource, you inform the resource council that it is available for use by others.

Resource councils and refeeding projects jointly form the **resource network**. Their common goal is to ensure that resources are available where and when needed. Per general agreement, communities that have lots of resources share a part of them with others who can use them. After all, they didn't do anything special to deserve more than others. On the other hand, it wouldn't be fair if they had more work with extracting and transporting resources just because they can be found in their neighborhood. Therefore, per the same agreement, other communities encourage volunteers to help with resource extraction wherever necessary. This wasn't always easy, because mining tended to be an unpopular task that frequently ended up on the white list. But by now, there is rarely a lack of volunteers, since most resources are recycled and since automated mining has advanced a lot. Coordinating and supervising machines is often enough. Even the few harder tasks that remain are generally easy to distribute: many people appreciate doing them for some time as an unusual new experience.

Resource councils also try to detect impending bottlenecks and find remedies before they become real. For example, they coordinate with the local **construction projects** to take care of expected needs for housing and workspaces. These projects plan new or remodeled buildings as required, consulting the potential users whenever possible, and coordinate construction. They often use prefabricated elements that can be fabricated automatically, such as structural insulated panels (SIPs). This facilitates construction a lot.

As large building projects nevertheless require a great deal of work, they are often organized as community sprints. In addition to the members of the construction project and the future users, everybody living nearby is invited to help and bring the enterprise to a

quick conclusion. Community sprints are often like big parties. After working together, you celebrate together. Of course, nobody is required to partake, but many do.

Resource councils keep lists of areas that cannot be used, say because local tradition considers them sacred or otherwise special, or because people have agreed that exploiting them would be destructive. Occasionally there is controversy about which places to add to these lists. If all else fails, the conflict council must decide. But that's rare, since most cases can be resolved according to the rough consensus principle: if utilizing a place or resource displeases many or is considered unacceptable by some, it won't happen.

The flow of material between projects follows agreements with fab hubs, vitamin factories, refeeding projects, and sometimes specialized supplier projects. Resource councils help with coordinating the flow of primary products and raw materials to where they are needed. Decenters and projects in need of special equipment may produce it themselves with the help of nearby fab hubs. Or they coordinate with other projects to set up joint supplier projects that produce for the demand of their parent projects.

The purpose of **conflict councils** is to resolve conflicts in difficult cases where those involved fail to do so. Resource council and route councils are staffed by lot in some places, by self-selection elsewhere. The members of conflict councils, however, are drawn by lot everywhere. Every community member adds their name to the lottery once they feel old enough. When you later feel too old or too ill, you can remove it again. If your name is drawn, you become a council member for one year. To avoid interruptions to your other projects and activities, you don't have to start immediately, but can delay for up to twelve months.

There is no second term. After you have served once, your name is permanently removed from the lottery. But there are distinct lotteries for different kinds of councils, hence former members of a regular conflict council might still be drawn for an ad-hoc conflict council, a resource council, or a route project (and vice versa). Participation in the lottery is not strictly required, but refusal would be considered bad style.

Conflict councils are only invoked as a last resort. People usually try to resolve their conflicts between themselves. If necessary, they can ask voluntary mediation teams to help finding a solution. The basic principle of conflict resolution is to accept the others as your peers, to take their needs as serious as your own. If you forget this, the people around you may gently remind you. Mostly this principle allows finding a consensus everybody can accept (if maybe grumpily), without having to involve the council.

Many conflicts are about who gets to use a certain space or about concerns of potential or actual neighbors. (The vitamin factory next door makes noise until late night! Couldn't that planned chemistry project release toxic gases?!) Others are about patterns of behavior that don't fit together. (Some people like smoking in the community cafe, others suffer from the smoke).

Most conflicts can be resolved without anyone losing much. The central square might become a community cafe or fairground, while the project that would have liked to use it gets another space not far away. Smoking in the community cafe or in another public place might be allowed in certain parts of the building or during certain times, but not everywhere and all the time. To alleviate conflicts over housing, the best spots are typically used as public places or holiday apartments. Thus they are shared among many.

Projects need to take care that they address the concerns of their potential neighbors. If they fail to do so, they have to find a more secluded space where nobody feels at risk or disturbed. In the worst case, a project might have to abstain entirely, if community members consider it too risky no matter what.

If projects or individuals try to defy a conflict council's decision, they have to expect not only vocal public criticism ("flaming"), but also boycotts and exclusion ("shunning"). Projects might be cut off from access to primary products and resources, and they'll lose users and contributors. People might be excluded from the projects they're involved in.

If a conflict is too big for a single community to resolve (communities usually have about 20,000 to 200,000 members and comprise several villages, a town or an urban quarter), an **ad-hoc conflict council** is established that exists just long enough to resolve this particular conflict. Members of the ad-hoc councils are drawn by lot from among the residents of all communities involved.

Once people seem to have thought that people would beat each other up all the time, unless kept in check by strong authority. They also thought that the only way to spare everyone from having to live in permanent fear of losing what they have would be to label every artifact and every piece of nature as somebody's exclusive property. But actually, it seems that they had created most of the problems they feared by themselves, by establishing and maintaining the social order of their times. Today we live without fear or hardship in a society that no longer needs borders or systematic exclusion. A society that enables everyone to live and act as they prefer, influenced, but not forced by others. Viewing human diversity as an advantage rather than a threat, we have managed to jointly self-organize our re/production. No longer a problem or a burden, it's now an integral part of what makes life beautiful.

## Appendix: Some Early Projects

- The GNU Project started the free source/software movement: <http://www.gnu.org/>
- Debian, the most important GNU/Linux distribution: <http://www.debian.org/>
- Wikipedia, a stigmergic encyclopedia: <http://en.wikipedia.org/>
- The Internet Engineering Task Force sets standards for the Internet and coined the principle of “rough consensus and running code”: <http://www.ietf.org/>
- RepRap, a project building free-source 3D printer that can reproduce many of their own parts: <http://www.reprap.org/>
- Shapeoko, a free-source CNC mill: <http://www.shapeoko.com/>
- The OSLOOM project aims to create a free-source Jacquard loom: <http://www.osloom.org/>
- Thingiverse is a directory of free designs for 3D printers and other home fabrication machines: <http://www.thingiverse.com/>
- The Airbike, a 3D-printed bicycle: [http://www.eads.com/eads/int/en/news/press.20110307\\_eads\\_airbike.html](http://www.eads.com/eads/int/en/news/press.20110307_eads_airbike.html)
- A 3D-printable wind turbine: <http://www.thingiverse.com/thing:28773>
- Arduino and OLinuXino, two free-source microcontrollers: <http://www.arduino.cc/>, <https://www.olimex.com/Products/OLinuXino/>
- FreedomBox is a Debian-based operating system for small personal web servers: <http://freedomboxfoundation.org/>
- Arduino-based aquaponics: <http://www.youtube.com/watch?v=3lryIOyPfTE>
- A German project for converting bicycles into e-bikes: <http://elektronenrad.de/>
- Two light electric vehicles: <http://www.twike.com/>, <http://www.gemcar.com/>

## License

This work is licensed under the Creative Commons Attribution-ShareAlike 3.0 Unported License (CC BY-SA). To view a copy of this license, visit <http://creativecommons.org/licenses/by-sa/3.0/>.