

THE ALTERNATIVE ECONOMY AS A SINGULARITY

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Introduction

We have seen the burdens of high overhead that the conventional, hierarchical enterprise and mass-production industry carry with them, their tendency to confuse the expenditure of inputs with productive output, and their culture of cost-plus markup. Running throughout the previous four papers, as a central theme, has been the superior efficiency of the alternative economy: its lower burdens of overhead, its more intensive use of inputs, and its avoidance of idle capacity.¹

Two economies are fighting to the death: one of them a highly-capitalized, high-overhead, and bureaucratically ossified conventional economy, the subsidized and protected product of one and a half century's collusion between big government and big business; the other a low capital, low-overhead, agile and resilient alternative economy, outperforming the state capitalist economy despite being hobbled and driven underground.

The alternative economy is developing within the interstices of the old one, preparing to supplant it. The Wobbly slogan “building the structure of the new society within the shell of the old” is one of the most fitting phrases ever coined for summing up the concept.

John Robb uses STEMI compression, an engineering analysis template, as a tool for evaluating the comparative efficiency of his proposed Resilient Communities:

In the evolution of technology, the next generation of a particular device/program often follows a well known pattern in the marketplace: its design makes it MUCH cheaper, faster, and more capable. This allows it to crowd out the former technology and eventually dominate the market (i.e. transistors replacing vacuum tubes in computation). A formalization of this developmental process is known as STEMI compression:

- Space. Less volume/area used.
- Time. Faster.
- Energy. Less energy. Higher efficiency.
- Mass. Less waste.
- Information. Higher efficiency. Less management overhead.

So, the viability of a proposed new generation of a particular technology can often be evaluated based on whether it offers a substantial improvement in the compression of all aspects of STEMI without a major loss in system complexity or capability. This process of analysis also gives us an "arrow" of development that can be traced over the life of a given technology.

The relevance of the concept, he suggests, may go beyond new generations of technology. “Do Resilient Communities offer the promise of a generational improvement over the existing global system or not?”

In other words: is the Resilient Community concept (as envisioned here) a viable self-organizing system that can rapidly and virally crowd out existing structures due to its systemic improvements? Using STEMI compression as a measure, there is reason to believe it is:

1 “Moloch: Mass-Production Industry as a Statist Construct” C4SS Paper No. 3 (July 2009) <<http://c4ss.org/wp-content/uploads/2009/08/Moloch.pdf>>; “The Decline and Fall of Sloanism” C4SS Paper No. 4 (August 2009) <<http://c4ss.org/wp-content/uploads/2009/09/Decline-and-Fall-of-Sloanism.pdf>>; “The Homebrew Industrial Revolution” C4SS Paper No. 5 (September 2009) <<http://c4ss.org/wp-content/uploads/2009/09/C4SS-Desktop-Manufacturing.pdf>>; “Society After State Capitalism: Resilient Communities and Local Economies” C4SS Paper No. 6 (October-November 2009) <<http://c4ss.org/wp-content/uploads/2009/11/C4SS-Resilient-Communities-and-Local-Economies>>.

- Space. Localization (or hyperlocalization) radically reduces the space needed to support any given unit of human activity. Turns useless space (residential, etc.) into productive space.
- Time. Wasted time in global transport is washed away. JIT (just in time production) and place.
- Energy. Wasted energy for global transport is eliminated. Energy production is tied to locality of use. More efficient use of solar energy (the only true exogenous energy input to our global system).
- Mass. Less systemic wastage. Made to order vs. made for market.
- Information. Radical simplification. Replaces hideously complex global management overhead with simple local management systems.²

The contrast between Robb's Resilient Communities and the current global system dovetails, more or less, with that between our two economies. And his STEMI compression template, as a model for analyzing the alternative economy's superiorities over corporate capitalism, overlaps with a wide range of conceptual models developed by other thinkers. Whether it be Buckminster Fuller's ephemeralization, or lean production's eliminating *muda* and “doing more and more with less and less,” the same general idea has a very wide currency.

A good example is what Mamading Ceesay calls the “economies of agility.” The emerging postindustrial age is a “network age where emerging Peer Production will be driven by the economies of agility.”

Economies of scale are about driving down costs of manufactured goods by producing them on a large scale. Economies of agility in contrast are about quickly being able to switch between producing different goods and services in response to demand.³

If the Toyota Production System is a quantum improvement on Sloanist mass-production in terms of STEMI compression and the economics of agility, and networked production on the Emilia-Romagna model is a similar advancement on the TPS, then the informal and household economy is an order of magnitude improvement on both of them.

Jeff Vail uses the term “Rhizome” to describe a set of characteristics that are also common to Robb's Resilient Communities and my alternative economy: “an alternative mode of human organization consisting of a network of minimally self-sufficient nodes that leverage non-hierarchical coordination of economic activity.”

The two key concepts in my formulation of rhizome are 1) minimal self-sufficiency, which eliminates the dependencies that accrete [sic] hierarchy, and 2) loose and dynamic networking that uses the “small worlds” theory of network information processing to allow rhizome to overcome information processing burdens that normally overburden hierarchies.⁴

By these standards, the alternative economy that we saw emerging from the crises of state capitalism in previous papers is capable of eating the corporate-state economy for lunch.

² John Robb, “STEMI Compression,” *Global Guerrillas* blog, November 12, 2008 <<http://globalguerrillas.typepad.com/globalguerrillas/2008/11/stemi.html>>.

³ Mamading Ceesay, “The Economies of Agility and Disrupting the Nature of the Firm,” *Confessions of an Autodidactic Engineer*, March 31, 2009 <<http://evangineer.agoraworx.com/blog/2009-03-31-the-economies-of-agility-and-disrupting-the-nature-of-the-firm.html>>.

⁴ Jeff Vail, “What is Rhizome?” *JeffVail.Net*, January 28, 2008 <<http://www.jeffvail.net/2007/01/what-is-rhizome.html>>.

Networked Production and the Bypassing of Corporate Nodes

One of the beauties of networked production, for subcontractors ranging from the garage shop to the small factory, is that it transforms the old corporate headquarters into a node to be bypassed.

Johan Soderberg suggests that the current model of outsourcing and networked production makes capital vulnerable to being cut out of the production process by labor. He begins with an anecdote about Toyota subcontractor Aisin Seiki, "the only manufacturer of a component critical to the whole Toyota network," whose factory was destroyed in a fire:

The whole conglomerate was in jeopardy of grinding to a halt. In two months Toyota would run out of supplies of the parts produced by Aisin Seiki. Faced with looming disaster, the network of subcontractors fervently cooperated and created provisory means for substituting the factory. In a stunningly short time, Toyota subsidiaries had restructured themselves and could carry on unaffected by the incident. Duncan Watt attributes the swift response by the Toyota conglomerate to its networked mode of organisation. The relevance of this story for labour theory becomes apparent if we stipulate that the factory was not destroyed in an accident but was held-up in a labour conflict. Networked capital turns every point of production, from the firm down to the individual work assignment, into a node subject to circumvention. ...[I]t is capital's ambition to route around labour strongholds that has brought capitalism into network production.... Nations, factories, natural resources, and positions within the social and technical division of labour, are all made subject to redundancy. Thus has capital annulled the threat of blockages against necks in the capitalist production chain, upon which the negotiating power of unions is based.

But this redundancy created by capital as a way of routing around blockages, Soderberg continues, threatens to make capital itself redundant:

The fading strength of unions will continue for as long as organised labour is entrenched in past victories and outdated forms of resistance. But the networked mode of production opens up a "window of opportunity" for a renewed cycle of struggle, this time, however, of a different kind. *Since all points of production have been transformed into potentially redundant nodes of a network, capital as a factor of production in the network has itself become a node subject to redundancy.*⁵

Soderberg sees the growing importance of human relative to physical capital, and the rise of peer production in the informational realm, as reason for hope that independent and self-managed networks of laborers can route around capital. Hence the importance he attaches to the increasingly draconian "intellectual property" regime as a way of suppressing the open-source movement and maintaining control over the conditions of production.⁶

Dave Pollard, writing from the imaginary perspective of 2015, made a similar observation about the vulnerability of corporations that follow the Nike model of hollowing themselves out and outsourcing everything:

In the early 2000s, large corporations that were once hierarchical end-to-end business enterprises began shedding everything that was not deemed 'core competency', in some cases to the point where the only things left were business acumen, market knowledge, experience, decision-making ability, brand name, and aggregation skills. This 'hollowing out' allowed multinationals to achieve enormous leverage and margin. It also made them enormously vulnerable and potentially dispensable.

⁵ Johan Soderberg, *Hacking Capitalism: The Free and Open Source Software Movement* (New York and London: Routledge, 2008), pp. 141-142.

⁶ *Ibid.*, pp. 142-142

As outsourcing accelerated, some small companies discovered how to exploit this very vulnerability. When, for example, they identified North American manufacturers outsourcing domestic production to third world plants in the interest of 'increasing productivity', they went directly to the third world manufacturers, offered them a bit more, and then went directly to the North American retailers, and offered to charge them less. The expensive outsourcers quickly found themselves unnecessary middlemen.... The large corporations, having shed everything they thought was non 'core competency', learned to their chagrin that in the connected, information economy, the value of their core competency was much less than the inflated value of their stock, and they have lost much of their market share to new federations of small entrepreneurial businesses.⁷

The worst nightmare of the corporate dinosaurs is that, in an economy where “imagination” or human capital is the main source of value, the imagination might take a walk: that is, the people who actually possess the imagination might figure out they no longer need the company's permission, and realize its "intellectual property" is unenforceable in an age of encryption and bittorrent (the same is becoming true in manufacturing, as the discovery and enforcement of patent rights against reverse-engineering efforts by hundreds of small shops serving small local markets becomes simply more costly than it's worth).

The Advantages of Value Creation Outside the Cash Nexus

We already examined, in C4SS Papers 4 and 5, the tendencies toward a sharp reduction in the number of wage hours worked and increased production of value in the informal sector. From the standpoint of efficiency and bargaining power, this has many advantages.

On the individual level, a key advantage of the informal and household economy lies in its offer of an alternative to wage employment for meeting a major share of one's subsistence needs, and the increased bargaining power of labor in what wage employment remains.

How much does the laborer increase his freedom if he happens to own a home, so that there is no landlord to evict him, and how much still greater is his freedom if he lives on a homestead where he can produce his own food?

That the possession of capital makes a man independent in his dealings with his fellows is a self-evident fact. It makes him independent merely because it furnishes him actually or potentially means which he can use to produce support for himself without first securing the permission of other men.⁸

Borsodi demonstrated some eight decades ago—using statistics!—that the hourly “wage” from gardening and canning, and otherwise replacing external purchases with home production, is greater than the wages of most outside employment.⁹

Contra conventional finance gurus like Suze Orman, who recommend investments like lifetime cost averaging of stock purchases, contributing to a 401k up to the employer's maximum matching contribution, etc., the most sensible genuine investment for the average person is capital investment in reducing his need for outside income. This includes building or purchasing the roof over his head as cheaply and paying it off as quickly as possible, and substituting home production for purchases with

⁷ David Pollard, "The Future of Business," *How to Save the World*, January 14, 2004 <<http://blogs.salon.com/0002007/2004/01/14.html>>.

⁸ Ralph Borsodi, *Prosperity and Security* (New York and London: Harper & Brothers, 1938), p. 241.

⁹ Borsodi, *This Ugly Civilization* (Philadelphia: Porcupine Press, 1929, 1975), p. 99.

wage money whenever the first alternative is reasonably competitive. Compared to the fluctuation in value of financial investments, Borsodi writes,

the acquisition of things which you can use to produce the essentials of comfort—houses and lands, machines and equipment—are not subject to these vicissitudes.... For their economic utility is dependent upon yourself and is not subject to change by markets, by laws or by corporations which you do not control.¹⁰

The home producer is free from “the insecurity which haunts the myriads who can buy the necessities of life only so long as they hold their jobs.”¹¹ A household with no mortgage payment, a large garden and a well-stocked pantry might survive indefinitely, if inconveniently, with only one part-time wage earner.

More Efficient Extraction of Value from Inputs

The great virtue of the informal and household economy is its superior efficiency in using limited resources intensively, as opposed to mass-production capitalist industry's practice of adding subsidized inputs extensively. The alternative economy reduces waste and inefficiency through the greater efficiency with which it extracts use-value from a given amount of land or capital.

An important concept for understanding the alternative economy's more efficient use of inputs is “productive recursion,” which Nathan Cravens uses to refer to the order of magnitude reduction in labor required to obtain a good when it is produced in the social economy, without the artificial levels of overhead and waste associated with the corporate-state nexus.¹² Savings in productive recursion include (say) laboring to produce a design in a fraction of the time it would take to earn the money to pay for a proprietary design, or simply using an open source design, and reforging scrap metal at a tenth the cost of using virgin metal.¹³

Production methods lower the cost of products when simplified for rapid replication. That is called productive recursion. Understanding productive recursion is the first step to understanding how we need to restructure Industrial economic systems in response to this form of technological change. If Industrial systems are not reconfigured for productive recursion, they will collapse before reaching anywhere near full automation. I hope this writing helps divert a kink in the proliferation of personal desktop fabrication and full productive automation generally.¹⁴

He cites, from Neil Gershenfeld's *Fab*, a series of “cases that prove the theory of productive recursion in practice.” One example is the greatly reduced cost for cable service in rural Indian villages, “due to reverse engineered satellite receivers by means of distributed production.” Quoting from *Fab*:

A typical village cable system might have a hundred subscribers, who pay one hundred rupees (about two dollars) per month. Payment is prompt, because the “cable-wallahs” stop by each of their subscribers personally and rather persuasively make sure that they pay. Visiting one of these cable operators, I was intrigued by the technology that makes these systems possible and financially viable.

10 Ibid., p. 337.

11 Ibid., p. 352.

12 Nathan Cravens, “Productive Recursion Proven,” *Open Manufacturing* (Google Groups), March 8, 2009 <http://groups.google.com/group/openmanufacturing/browse_thread/thread/f819aab7683b93ac?pli=1>.

13 Cravens, “Productive Recursion,” *Open Source Ecology* Wiki <http://openfarmtech.org/index.php?title=Productive_Recursion>.

14 Cravens, “Productive Recursion Proven.”

A handmade satellite antenna on his roof fed the village's cable network. Instead of a roomful of electronics, the head end of his cable network was just a shelf at the foot of his bed. A sensitive receiver there detects and interprets the weak signal from the satellite, then the signal is amplified and fed into the cable for distribution around the village. The heart of all this is the satellite receiver, which sells for a few hundred dollars in the United States. He reported that the cost of his was one thousand rupees, about twenty dollars.¹⁵

The cheap satellite receiver was built by Sharp, which after some legwork Gershenfeld found to be “an entirely independent domestic brand” run out of a room full of workbenches in a district of furniture workshops in Delhi.

They produced all of their own products, although not in that room—done there, it would cost too much. The assembly work was farmed out to homes in the community, where the parts were put together. Sharp operated like a farm market or grain elevator, paying a market-based per-piece price on what was brought in. The job of the Sharp employees was to test the final products.

The heart of the business was in a back room, where an engineer was busy taking apart last-generation video products from developed markets. Just as the students in my fab class would learn from their predecessors' designs and use them as the starting point for their own, this engineer was getting a hands-on education in satellite reception from the handiwork of unknown engineers elsewhere. He would reverse engineer their designs to understand them, then redo the designs so that they could be made more simply and cheaply with locally available components and processes. And just as my students weren't guilty of plagiarism because of the value they added to the earlier projects, this engineer's inspiration by product designs that had long since become obsolete was not likely to be a concern to the original satellite-receiver manufacturers.

The engineer at the apex of the Sharp pyramid was good at his job, but also frustrated. Their business model started with existing product designs. The company saw a business opportunity to branch out from cable television to cable Internet access, but there weren't yet available obsolete cable modems using commodity parts that they could reverse-engineer. Because cable modems are so recent, they use highly integrated state-of-the-art components that can't be understood by external inspection, and that aren't amenable to assembly in a home. But there no technological reason that data networks couldn't be produced in just this way, providing rural India with Internet access along with Bollywood soap operas....

...There isn't even a single entity with which to partner on a joint venture; the whole operation is fundamentally distributed.¹⁶

Another example of productive recursion, also from Gershenfeld's experiences in India, is the reverse engineering of ground resistance meters.

For example, the ground resistance meters that were used for locating water in the era cost 25,000 rupees (about \$500). At Vigyan Ashram they bought one, stripped it apart, and from studying it figured out how to make them for just 5,000 rupees.... Another example arose because they needed a tractor on the farm at Vigyan Ashram, but could not afford to buy a new one. Instead, they developed their own "MechBull" made out of spare jeep parts for 60,000 rupees (\$1,200). This proved to be so popular that a Vigyan Ashram alum built a business making and selling these tractors.¹⁷

15 Neil Gershenfeld, *Fab: The Coming Revolution on Your Desktop—from Personal Computers to Personal Fabrication* (New York: Basic Books, 2005), p. 182.

16 Ibid., pp. 185-187.

17 Ibid. p. 164.

Yet another is a walk-behind tractor, developed from a modified motorcycle within Anil Gupta's "Honeybee Network" (an Indian alternative technology group).

Modeled on how honeybees work—collecting pollen without harming the flowers and connecting flowers by sharing the pollen—the Honeybee Network collects and helps develop ideas from grassroots inventors, sharing rather than taking their ideas. At last count they had a database of ten thousand inventions.

One Indian inventor couldn't afford or justify buying a large tractor for his small farm; it cost the equivalent of \$2,500. But he could afford a motorcycle for about \$800. So he came up with a \$400 kit to convert a motorcycle into a three-wheeled tractor (removable of course, so that it's still useful as transportation). Another agricultural inventor was faced with a similar problem in applying fertilizer; his solution was to modify a bicycle.¹⁸

Another example (this one independent of Cravens and Gershenfeld) is a Dutch man who built his own solar panels with total material costs a third those of mass-produced panels, buying the cells on eBay. His output cost is 1.20 Euro per Watt Peak.¹⁹

According to Marcin Jakubowski of Open Source Ecology, the effects of productive recursion are cumulative. "Cascading Factor 10 cost reduction occurs when the availability of one product decreases the cost of the next product."²⁰ We already saw, in C4SS Paper No. 5, the specific case of the CEB Press, which can be produced for around 20% of the cost of purchasing a competing commercial model.

Amory Lovins and his coauthors, in *Natural Capitalism*, described the cascading cost savings ("Tunneling Through the Cost Barrier") that result when the efficiencies of one stage of design reduce costs in later stages. Incremental increases in efficiency may increase costs, but large-scale efficiency improvements in entire designs may actually result in major cost reductions. Improving the efficiency of individual components in isolation can be expensive, but improving the efficiency of systems can reduce costs by orders of magnitude.²¹

Much of the art of engineering for advanced resource efficiency involves harnessing helpful interactions between specific measures so that, like loaves and fishes, the savings keep on multiplying. The most basic way to do this is to "think backward," from downstream to upstream in a system. A typical industrial pumping system, for example..., contains so many compounding losses that about a hundred units of fossil fuel at a typical power station will deliver enough electricity to the controls and motor to deliver enough torque to the pump to deliver only ten units of flow out of the pipe—a loss factor of about tenfold.

But turn those ten-to-one compounding losses around backward..., and they generate a one-to-ten compounding *saving*. That is, saving one unit of energy furthest downstream (such as by reducing flow or friction in pipes) avoids enough compounding losses from power plant to end use to save about ten units of fuel, cost, and pollution back at the power plant.²²

For example, both power steering and V-8 engines resulted from Detroit's massive increases in

18 Ibid., p. 88.

19 Timothy, "Building Your Own Solar Panel in the Garage," *Slashdot*, March 20, 2009 <http://hardware.slashdot.org/article.pl?sid=09/03/20/0220227&art_pos=6>.

20 Marcin Jakubowski, "OSE Proposal—Towards a World Class Open Source Research and Development Facility," v0.12, January 16, 2008 <http://openfarmtech.org/OSE_Proposal.doc>.

21 Paul Hawken, Amory Lovins, and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution* (Boston, New York, and London: Little, Brown and Company, 1999), pp. 113-124.

22 Ibid., p. 121.

automobile weight in the 1930s; the introduction of lightweight frames, conversely, makes possible the use of much lighter internal combustion engines or even electric motors, which in turn eliminate the need for power steering.

Vinay Gupta described some of the specific efficiencies that combine to reduce the alternative economy's costs by an order of magnitude.²³ The most important efficiency comes from distributed infrastructure which provides

the same class of services that are provided by centralized systems like the water and power grids, but without the massive centralized investments in physical plant. For example, dry toilets and solar panels can provide high quality services household by household without a grid.

The digital revolution and network organization interact with distributed infrastructure to remove most of the administrative and other transaction costs involved in coordinating effort: the creation of new technologies by self-selected individuals or groups most suited to develop them, and the subsequent distribution of those technologies to the people who can benefit from them. It is, in other words, governed by the same rules as Eric Raymond's Bazaar, which are also the basis of John Robb's "open source insurgency" and Jeff Vail's "rhizome."

8. Given a large enough beta-tester and co-developer base, almost every problem will be characterized quickly and the fix obvious to someone.

Or, less formally, "Given enough eyeballs, all bugs are shallow." I dub this: "Linus's Law".

My original formulation was that every problem "will be transparent to somebody". Linus demurred that the person who understands and fixes the problem is not necessarily or even usually the person who first characterizes it. "Somebody finds the problem," he says, "and somebody else understands it. And I'll go on record as saying that finding it is the bigger challenge." That correction is important; we'll see how in the next section, when we examine the practice of debugging in more detail. But the key point is that both parts of the process (finding and fixing) tend to happen rapidly.

In Linus's Law, I think, lies the core difference underlying the cathedral-builder and bazaar styles. In the cathedral-builder view of programming, bugs and development problems are tricky, insidious, deep phenomena. It takes months of scrutiny by a dedicated few to develop confidence that you've winkled them all out. Thus the long release intervals, and the inevitable disappointment when long-awaited releases are not perfect.

In the bazaar view, on the other hand, you assume that bugs are generally shallow phenomena—or, at least, that they turn shallow pretty quickly when exposed to a thousand eager co-developers pounding on every single new release. Accordingly you release often in order to get more corrections, and as a beneficial side effect you have less to lose if an occasional botch gets out the door.²⁴

Raymond argues that Brooks's Law ("Adding more programmers to a late project makes it later.") is actually a problem associated with organizing software development inside a traditional hierarchical organization. Since tasks are assigned, coordinated and supervised through a central hub, increases in the number of developers result in exponential increases in the complexity of relationships to be

²³ Vinay Gupta, "The Global Village Development Bank: financing infrastructure at the individual, household and village level worldwide" Draft 2 (March 12, 2009) <<http://vinay.howtolivewiki.com/blog/hexayurt/my-latest-piece-the-global-village-development-bank-1348>>.

²⁴ Eric S. Raymond, "Release Early, Release Often," *The Cathedral and the Bazaar* (version 3.0, 2000) <<http://www.catb.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/ar01s04.html>>.

managed. The Bazaar, by adopting stigmergic forms of coordination, avoids all the transaction costs of traditional bureaucracy.²⁵

Distributed infrastructure also benefits from “economies of agility,” as opposed to the enormous capital outlays in conventional blockbuster investments that must frequently be abandoned as “sunk costs” when the situation changes or funding stops. “...[H]alf a dam is no dam at all, but 500 of 1000 small projects is half way to the goal.” And distributed infrastructure projects manage to do without the enormous administrative and overhead costs of conventional organizations, which we saw described by Paul Goodman in C4SS Paper No. 3; most of the organization and planning are done by those with the technical knowledge and sweat equity, who are directly engaged in the project and reacting to the situation on the ground.

And finally, Gupta argues, distributed finance—microcredit—interacts with distributed infrastructure and network organization to heighten the advantages of agility and low overhead still further.

Malcolm Gladwell's “David vs. Goliath” analysis of military history is an excellent illustration of the economies of agility. Victory goes to the bigger battalions about seven times out of ten—when Goliath outnumbers David ten to one, that is. But when the smaller army, outnumbered ten to one, acknowledges the fact and deliberately chooses unconventional tactics that target Goliath's weaknesses, it actually wins about six times out of ten. “When underdogs choose not to play by Goliath’s rules, they win...” Guerrilla fighters from J.E.B. Stuart to T. E. Lawrence to Ho Chi Minh have learned, as General Maurice de Saxe put it, that victory is about legs rather than arms. As Lawrence wrote, “Our largest available resources were the tribesmen, men quite unused to formal warfare, whose assets were movement, endurance, individual intelligence, knowledge of the country, courage.”²⁶ Another good example is what the U.S. military (analyzing Chinese asymmetric warfare capabilities) calls “Assassin's Maces”: “anything which provides a cheap means of countering an expensive weapon.” A good example is the black box that transmits ten thousand signals on the same frequency used by SAM missiles, and thus overwhelms American air-to-surface missiles which target SAM radio signals. The Chinese, apparently, work from the assumption that the U.S. develops countermeasures to “Assassin's Mace” weapons, and deliberately make it easier for American intelligence to acquire older such weapons as a form of disinformation; there's good reason to believe the Chinese military can work around American countermeasures much more quickly, and cheaply, than the U.S. can develop them.²⁷

And distributed infrastructure benefits, as well, from what John Robb calls “scale invariance”²⁸: the ability of the part, in cases of system disruption, to replicate the whole. Each part conserves the features that define the whole, on the same principle as a hologram. Projects like Open-Source Ecology,²⁹ once the major components of a local site are in place, can duplicate any of the individual components or duplicate them all to create a second site. The Fab Lab can produce the parts for a steam engine, CEB press, tractor, sawmill, etc., or even the machine tools for another Fab Lab.

25 Raymond, “How Many Eyeballs Tame Complexity,” in *Ibid.* <<http://www.catb.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/ar01s05.html>>.

26 Malcolm Gladwell, “How David Beats Goliath,” *The New Yorker*, May 11, 2009 <http://www.newyorker.com/reporting/2009/05/11/090511fa_fact_gladwell?currentPage=all>.

27 David Hambling, “China Looks to Undermine U.S. Power, With ‘Assassin’s Mace’.” *Wired*, July 2 <<http://www.wired.com/dangerroom/2009/07/china-looks-to-undermine-us-power-with-assassins-mace/>>.

28 John Robb, “Resilient Communities and Scale Invariance,” *Global Guerrillas*, April 16, 2009 <<http://globalguerrillas.typepad.com/globalguerrillas/2009/04/resilient-communities-and-scale-invariance.html>>.

29 See C4SS Paper No. 5..

Distributist writer John Medaille pointed out, by private email, that the Israelites under the Judges were a good example of superior extraction of value from inputs. At a time when the “more civilized” Philistines dominated most of the fertile valleys of Palestine, the Israelite confederacy stuck to the central highlands. But their “alternative technology,” focused on extracting more productivity from marginal land, enabled them to make more intensive use of what was unusable to the Philistines.

The tribes clung to the hilltops because the valleys were "owned" by the townies (Philistines) and the law of rents was in full operation. The Hebrews were free in the hills, and increasingly prosperous, both because of their freedom and because of new technologies, namely contoured plowing and waterproof cement, which allowed the construction of cisterns to put them through the dry season.³⁰

In other words, a new technological regime supplanted a more privileged form of society through superior efficiency, despite being disadvantaged in access to productive inputs. The Hebrews were able to outcompete the dominant social system by making more efficient and intensive use of inputs that were “unusable” with conventional methods of economic organization.

The alternative economy, likewise, has taken for its cornerstone the stone which the builders refused. As I put it in a blog post (in an admittedly grandiose yet nevertheless eminently satisfying passage):

...[T]he owning classes use less efficient forms of production precisely because the state gives them preferential access to large tracts of land and subsidizes the inefficiency costs of large-scale production. Those engaged in the alternative economy, on the other hand, will be making the most intensive and efficient use of the land and capital available to them. So the balance of forces between the alternative and capitalist economy will not be anywhere near as uneven as the distribution of property might indicate.

If everyone capable of benefiting from the alternative economy participates in it, and it makes full and efficient use of the resources already available to them, eventually we'll have a society where most of what the average person consumes is produced in a network of self-employed or worker-owned production, and the owning classes are left with large tracts of land and understaffed factories that are almost useless to them because it's so hard to hire labor except at an unprofitable price. At that point, the correlation of forces will have shifted until the capitalists and landlords are islands in a mutualist sea--and their land and factories will be the last thing to fall, just like the U.S Embassy in Saigon.³¹

Soderberg refers to the possibility that increasing numbers of workers will "defect from the labour market" and "establish means of non-waged subsistence," through efficient use of the waste products of capitalism.³² The "freegan" lifestyle (less charitably called "dumpster diving") is one end of a spectrum of such possibilities. At the other end is low-cost recycling and upgrading of used and discarded electronic equipment: for example, the rapid depreciation of computers makes it possible to add RAM to a model a few years old at a small fraction of the cost of a new computer, with almost identical performance.

Reason's Brian Doherty, in a display of rather convoluted logic, attempted to depict freeganism as proof of capitalism's virtues:

It's nice of capitalism to provide such an overflowing cornucopia that the [freegans] of the world can opt

30 John Medaille, personal email to author, January 28, 2009.

31 Kevin Carson, “Building the Structure of the New Society Within the Shell of the Old,” *Mutualist Blog: Free Market Anti-Capitalism*, March 22, 2005 <<http://mutualist.blogspot.com/2005/03/building-structure-of-new-society.html>>.

32 Soderberg, *Hacking Capitalism*, p. 172.

out. Wouldn't it be gracious of them to show some love to the system that manages to keep them alive and thriving without even trying?³³

To take Doherty's argument and stand it on its head, consider the amount of waste resulting from the perverse incentives under the Soviet planned economy. In some cases, new refrigerators and other appliances were badly damaged by being roughly thrown off the train and onto a pile at the point of delivery, because the factory got credit simply for manufacturing them, and the railroad got credit for delivering them, under the metrics of the Five Year Plan. Whether they actually worked, or arrived at the retailer in a condition such that someone was willing to buy them, was beside the point. Now, imagine if some handy fellow in the Soviet alternative economy movement had bought up those fridges as factory rejects for a ruble apiece, or just bought them for scrap prices from a junkyard, and then got them in working order at little or no cost. Would Doherty be praising Soviet socialism for its efficiency in producing such a surplus that the Russian freegan could live off the waste?

When the alternative economy is able to make more efficient use of the waste byproducts of state capitalism—waste byproducts that result from the latter's inefficient use of subsidized inputs—and thereby supplant state capitalism from within by the superior use of its underutilized resources and waste, it is rather perverse to dismiss the alternative economy as just another hobby or lifestyle choice enabled by the enormous efficiencies of corporate capitalism. And the alternative economy is utilizing inputs that would otherwise be waste, and thereby establishing an ecological niche based on the difference between capitalism's actual and potential efficiencies; so to treat capitalism's inefficiencies as a mark of efficiency—i.e., how inefficient it can afford to be—is a display of Looking Glass logic.

One example of how the alternative economy permits the increasingly efficient extraction of value from waste material, by the way, is the way in which network technology facilitates repair even within the limits of proprietary design and the planned obsolescence model. To take just one example, Julian Sanchez has described how Apple's design practices serve to thwart cheap repair. The guys at the “Genius Bar” refused to repair a stuck key on his iPhone, or to tell him how to do it. “Just buy a new one,” they said. But even with a “bobject” casing designed to thwart opening up the phone, and without the proper tools, Sanchez was able to get the cases open after a few minutes fooling around with a keychain multi-tool and unjam the key—a fairly straightforward operation.³⁴ iFixit is an answer to that problem:

Kyle Wiens and Luke Soules started iFixit (ifixit.com) out of their dorms at Cal Poly in San Luis Obispo, Calif. That was six years ago. Today they have a self-funded business that sells the parts and tools you need to repair Apple equipment. One of their innovations is creating online repair manuals for free that show you how to make the repairs.

“Our biggest source of referrals is Apple employees, particularly folks at the Genius Bar,” Wien says. They refer customers who complain when Apple won't let them fix an out-of-warranty product. (Apple: “Just buy a new one!”)

iFixit will also harvest your old Mac and harvest the reusable parts to resell.... If it's starting to sound like an auto parts franchise, well, Wiens and Soules have been thinking about someday doing for cars what they do for computers and handhelds today.³⁵

33 Brian Doherty, “The Glories of Quasi-Capitalist Modernity, Dumpster Diving Division,” *Reason Hit & Run* Blog, September 12, 2007 <<http://reason.com/blog/show/122450.html>>.

34 Julian Sanchez, “Dammit, Apple,” *JulianSanchez.com*, June 2, 2008 <<http://www.juliansanchez.com/2008/06/02/dammit-apple/>>.

35 Dale Dougherty, “What's in Your Garage?” *Make*, vol. 18 <<http://www.make-digital.com/make/vol18/?pg=39>>.

In other words, the same Bazaar, or open-source insurgency, model that governs the file-sharing movement is spreading to encompass the development of all kinds of measures for routing around planned obsolescence and the other irrationalities of corporate capitalism. The reason for the quick adaptability of fourth generation warfare organizations, as described by John Robb, is that any innovation developed by a particular cell becomes available to the entire network. And by the same token, in the file-sharing world, it's not enough that DRM be sufficiently hard to circumvent to deter the average user. The average user need only use Google to benefit from the superior know-how of the geek who has already figured out how to circumvent it. Likewise, once anyone figures out how to circumvent any instance of planned obsolescence, their hardware hack becomes part of a universally accessible repository of knowledge.

As Cory Doctorow notes, cheap technologies which can be modularized and mixed-and-matched for any purpose are just lying around. "...[T]he market for facts has crashed. The Web has reduced the marginal cost of discovering a fact to \$0.00." He cites Robb's notion that "[o]pen source insurgencies don't run on detailed instructional manuals that describe tactics and techniques." Rather, they just run on "plausible premises." You just put out the plausible premise—i.e., the suggestion based on your gut intuition, based on current technical possibilities, that something can be done—that IED's can kill enemy soldiers, and then anyone can find out *how* to do it via the networked marketplace of ideas, with virtually zero transaction costs.

But this doesn't just work for insurgents — it works for anyone working to effect change or take control of her life. Tell someone that her car has a chip-based controller that can be hacked to improve gas mileage, and you give her the keywords to feed into Google to find out how to do this, where to find the equipment to do it — even the firms that specialize in doing it for you.

In the age of cheap facts, we now inhabit a world where knowing something is possible is practically the same as knowing how to do it.

This means that invention is now a lot more like collage than like discovery.

Doctorow mentions Bruce Sterling's reaction to the innovations developed by the protagonists of his (Doctorow's) *Makers*: "There's hardly any engineering. Almost all of this is mash-up tinkering." Or as Doctorow puts it, it "assembles rather than invents."

It's not that every invention has been invented, but we sure have a lot of basic parts just hanging around, waiting to be configured. Pick up a \$200 FPGA chip-toaster and you can burn your own microchips. Drag and drop some code-objects around and you can generate some software to run on it. None of this will be as efficient or effective as a bespoke solution, but it's all close enough for rock-n-roll.³⁶

Murray Bookchin anticipated something like this back in the 1970s, writing in *Post-Scarcity Anarchism*:

Suppose, fifty years ago, that someone had proposed a device which would cause an automobile to follow a white line down the middle of the road, automatically and even if the driver fell asleep.... He would have been laughed at, and his idea would have been called preposterous.... But suppose someone called for such a device today, and was willing to pay for it, leaving aside the question of whether it would actually be of any genuine use whatever. Any number of concerns would stand ready to contract and build it. No real invention

36 Cory Doctorow, "Cheap Facts and the Plausible Premise," *Locus Online*, July 5, 2009
<<http://www.locusmag.com/Perspectives/2009/07/cory-doctorow-cheap-facts-and-plausible.html>>.

would be required. There are thousands of young men in the country to whom the design of such a device would be a pleasure. They would simply take off the shelf some photocells, thermionic tubes, servo-mechanisms, relays, and, if urged, they would build what they call a breadboard model, and it would work. The point is that the presence of a host of versatile, reliable, cheap gadgets, and the presence of men who understand all their cheap ways, has rendered the building of automatic devices almost straightforward and routine. It is no longer a question of whether they can be built, it is a question of whether they are worth building.³⁷

The Implications of Reduced Physical Capital Costs

The informal and household economy reduces waste by its reliance on “spare cycles” of ordinary capital goods that most people already own. It makes productive use of idle capital assets the average person owns anyway, provides a productive outlet for the surplus labor of the unemployed, and transforms the small surpluses of household production into a ready source of exchange value.

Let's consider again our example of the home-based microenterprise—the microbrewery or restaurant—from C4SS Paper No. 5. Buying a brewing vat and a few small fermenters for your basement, using a few tables in an extra room as a public restaurant area, etc., would require a small bank loan for at most a few thousand dollars. And with that capital outlay, you could probably make payments on the debt with the margin from one customer a day. A few customers evenings and weekends, probably found mainly among your existing circle of acquaintances, would enable you to initially shift some of your working hours from wage labor to work in the restaurant, with the possibility of gradually phasing out wage labor altogether or scaling back to part time, as you built up a customer base. In this and many other lines of business (for example a part-time gypsy cab service using a car and cell phone you own anyway), the minimal entry costs and capital outlay mean that the minimum turnover required to pay the overhead and stay in business would be quite modest. In that case, a lot more people would be able to start small businesses for supplementary income and incrementally shift some of their wage work to self employment, with minimal risk or sunk costs.

The lower the initial capital outlays, and the lower the resulting overhead that must be serviced, the larger the percentage of its income stream belongs to the microenterprise without encumbrance—regardless of how much business it is able to do. It is under no pressure to “go big or not go at all,” to “get big or get out,” or to engage in large batch production to minimize unit costs from overhead, because it has virtually no overhead costs. So the microenterprise can ride out prolonged periods of slow business. If the microenterprise is based in a household which owns its living space free and clear and has a garden and well-stocked pantry, the household may be able to afford to go without income during slow spells and live off its savings from busy periods. Even if the household is dependent on some wage labor, the microenterprise in good times can be used as a supplemental source of income with no real cost or risk of the kind that would exist were there overhead to be serviced, and thereby enable a smaller wage income to go smaller in a household income-pooling unit.

That's why, as we saw in C4SS Paper No. 3, one of the central functions of so-called “health” and “safety” codes, and occupational licensing is to prevent people from using idle capacity (or “spare cycles”) of what they already own anyway, and thereby transforming them into capital goods for productive use. In general, state regulatory measures that increase the minimum level of overhead needed to engage in production will increase the rate of failure for small businesses, with pressure to

³⁷ Murray Bookchin, “Toward a Liberatory Technology,” in *Post-Scarcity Anarchism* (Berkeley, Calif.: The Ramparts Press, 1971), pp. 49-50.

intensified “cutthroat competition.” In the specific case of high burdens of interest-bearing debt, and the pressure to earn a sufficient revenue stream to repay the interest as well as the principal, Tom Greco writes,

As borrowers compete with one another to try to meet their debt obligations in this game of financial “musical chairs,” they are forced to expand their production, sales, and profits....

...Thus, debt continually mounts up, and businesses and individuals are forced to compete for markets and scarce money in a futile attempt to avoid defaulting on their debts. The system makes it certain that some *must* fail.³⁸

Because the household economy and the microenterprise require few or no capital outlays, their burden of overhead is miniscule. This removes the pressure to large-batch production. It removes the pressure to get out of business altogether and liquidate one's assets when business is slow, because there is no overhead to service. Reduced overhead costs reduce the failure rate; they reduce the cost of staying in business indefinitely, enjoying revenue free and clear in good periods and riding out slow ones with virtually no loss. As Borsodi wrote,

Only in the home can the owner of a machine afford the luxury of using it only when he has need of it. The housewife uses her washing machine only an hour or two per week. The laundry has to operate its washing machine continuously. Whether operating or not operating all of its machines, the factory has to earn enough to cover depreciation and obsolescence on them. Office overhead, too, must be earned, whether the factory operates on full time or only on part time.³⁹

And a housewife who uses her washing machine to full capacity in a household micro-laundry, with no additional marginal cost besides the price of soap, water, and power, will eat the commercial laundry alive.

Strong Incentives and Reduced Agency Costs

We already saw, above, Eric Raymond's description of how self-selection and incentives work in the Linux “Bazaar” model of open-source development. As Michel Bauwens put it,

the permissionless self-aggregation afforded by the internet, allowed humans to congregate around their passionate pursuits.... It was discovered that when people are motivated by intrinsic positive motivation, they are hyperproductive....

...[W]hile barely one in five of corporate workers are passionately motivated, one hundred percent of peer producers are, since the system filters out those lacking it!⁴⁰

As Johan Soderberg describes it:

To a hired programmer, the code he is writing is a means to get a pay check at the end of the month. Any shortcut when getting to the end of the month will do. For a hacker, on the other hand, writing code is an

38 Thomas Greco, *The End of Money and the Future of Civilization* (White River Junction, Vt.: Chelsea Green Publishing, 2009), p. 55.

39 Borsodi, *This Ugly Civilization*, p. 126.

40 Michel Bauwens, “The three revolutions in human productivity,” *P2P Foundation Blog*, November 29, 2009 <<http://blog.p2pfoundation.net/the-three-revolutions-in-human-productivity/2009/11/29>>.

end in itself. He will always pay full attention to his endeavour, or else he will be doing something else.⁴¹

The alternative economy reduces waste by eliminating all the waste of time involved in the “face time” paradigm. Wage labor and hierarchy are characterized by high degrees of “presenteeism.” Because the management is so divorced from the actual production process, it has insufficient knowledge of the work to develop a reliable metric of actual work accomplished. So it is required to rely on proxies for work accomplished, like the amount of time spent in the office and whether people “look busy.” Workers, who have no intrinsic interest in the work and who get paid for just being there, have no incentive to use their time efficiently.

Matthew Yglesias describes this as “the office illusion”: the equation of “being in the office” to “working.”

Thus, minor questions like *am I getting any work done?* can tend to slip away. Similarly, when I came into an office every day, I felt like I couldn't just leave the office just because I didn't want to do anymore work, so I would kind of foot-drag on things to make sure whatever task I had stretched out to fill the entire working day. If I'm not in an office, by contrast, I'm acutely aware that I have a budget of *tasks* that need to be accomplished, that “working” means finishing some of those tasks, and that when the tasks are done, I can go to the gym or go see a movie or watch TV. Thus, I tend to work in a relatively focused, disciplined manner and then go do something other than work rather than slack off.⁴²

Under the “face time” paradigm of wage employment at a workplace away from home, there is no trade-off between work and leisure. Anything done at work is “work,” for which one gets paid. There is no opportunity cost to slacking off on the job. In home employment, on the other hand, the trade-off between effort and consumption is clear. The self-employed worker knows how much productive labor is required to support his desired level of consumption, and gets it done so he can enjoy the rest of his life. If his work itself is a consumption good, he still balances it with the rest of his activities in a rational, utility-maximizing manner, because he is the conscious master of his time, and has no incentive to waste time because “I'm here anyway.” Any “work” he does which is comparatively unproductive or unrewarding comes at the expense of more productive or enjoyable ways of spending his time.

At work, on the other hand, all time belongs to the boss. A shift of work is an eight-hour chunk of one's life, cut off and flushed down the toilet for the money it will bring. And as a general rule, people do not make very efficient use of what belongs to someone else.

J.E. Meade contrasts the utility-maximizing behavior of a self-employed individual to that of a wage employee:

A worker hired at a given hourly wage in an Entrepreneurial firm will have to observe the minimum standard of work and effort in order to keep his job; but he will have no immediate personal financial motive... to behave in a way that will promote the profitability of the enterprise.... [A]ny extra profit due to his extra effort will in the first place accrue to the entrepreneur....

Let us go to the other extreme and consider a one-man Cooperative, i.e. a single self-employed worker who hires his equipment. He can balance money income against leisure and other amenities by pleasing

41 Johan Soderberg, *Hacking Capitalism: The Free and Open Source Software Movement* (New York and London: Routledge, 2008), p. 26.

42 Matthew Yglesias, “The Office Illusion,” *Matthew Yglesias*, September 1, 2007 <http://matthewyglesias.theatlantic.com/archives/2007/09/the_office_illusion.php>.

himself over hours of work, holidays, the pace and concentration of work, tea-breaks or the choice of equipment and methods of work which will make his work more pleasant at the cost of profitability. Any innovative ideas which he has, he can apply at once and reap the whole benefit himself.⁴³

This is true not only of self-employment in the household sector and of self-managed peer networks, but of self-managed cooperatives in the money economy as well. The latter require far less in the way of front-line managers than do conventional capitalist enterprises. Edward Greenberg contrasts the morale and engagement with work, among the employees of a capitalist enterprise, with that of workers who own and manage their place of employment:

Rather than seeing themselves as a group acting in mutuality to advance their collective interests and happiness, workers in conventional plants perceive their work existence, quite correctly, as one in which they are almost powerless, being used for the advancement and purposes of others, subject to the decisions of higher and more distant authority, and driven by a production process that is relentless....

The general mood of these two alternative types of work settings could not be more sharply contrasting. To people who find themselves in conventional, hierarchically structured work environments, the work experience is not humanly rewarding or enhancing. This seems to be a product of the all-too-familiar combination of repetitious and monotonous labor... and the structural position of powerlessness, one in which workers are part of the raw material that is manipulated, channeled, and directed by an only partly visible managerial hierarchy. Workers in such settings conceive of themselves, quite explicitly, as objects rather than subjects of the production process, and come to approach the entire situation, quite correctly, since they are responding to an objective situation of subordination, as one of a simple exchange of labor for wages. Work, done without a great deal of enthusiasm, is conceived of as intrinsically meaningless, yet necessary for the income that contributes to a decent life away from the workplace.⁴⁴

Greenberg notes a "striking" fact: "the vast difference in the number of supervisors and foremen found in conventional plants as compared with the plywood cooperatives."

While the latter were quite easily able to manage production with no more than two per shift, and often with only one, the former often requires six or seven. Such a disparity is not uncommon. I discovered in one mill that had recently been converted from a worker-owned to a conventional, privately owned firm that the very first action taken by the new management team was to quadruple the number of line supervisors and foremen. In the words of the general manager of this mill who had also been manager of the mill prior to its conversion,

*We need more foremen because, in the old days, the shareholders supervised themselves.... They cared for the machinery, kept their areas picked up, helped break up production bottlenecks all by themselves. That's not true anymore. We've got to pretty much keep on them all of the time.*⁴⁵

Workers in a cooperative enterprise put more of themselves into their work, and feel free to share their private knowledge—knowledge that would be exploited far more ruthlessly as a source of information rent in a conventional enterprise. Greenberg quotes a comment by a worker in a plywood co-op that speaks volumes on wage labor's inefficiency at aggregating distributed knowledge, compared to self-managed labor:

43 J.E. Meade, "The Theory of Labour-Managed Firms and Profit Sharing," in Jaroslav Vanek, ed., *Self-Management: Economic Liberation of Man* (Hammondsworth, Middlesex, England: Penguin Education, 1975), p. 395.

44 Edward S. Greenberg. "Producer Cooperatives and Democratic Theory" in Robert Jackall and Henry M. Levin, eds., *Worker Cooperatives in America* (Berkeley, Los Angeles, London: University of California Press, 1984), p. 185.

45 Ibid., p. 193.

If the people grading off the end of the dryer do not use reasonable prudence and they start mixing the grades too much, I get hold of somebody and I say, now look, this came over to me as face stock and it wouldn't even make decent back. What the hell's goin' on here?

[Interviewer: That wouldn't happen if it were a regular mill?]

That wouldn't happen. [In a regular mill]... he has absolutely no money invested in the product that's being manufactured.... He's selling nothing but his time. *Any knowledge he has on the side, he is not committed or he is not required to share that.* [emphasis added]

It took me a little while to get used to this because where I worked before... there was a union and you did your job and you didn't go out and do something else. Here you get in and do anything to help.... I see somebody needs help, why you just go help them.

I also tend to... look around and make sure things are working right a little more than... if I didn't have anything invested in the company.... I would probably never say anything when I saw something wrong.⁴⁶

Reduced Costs from Supporting Rentiers and Other Useless Eaters

The alternative economy reduces waste and increases efficiency by eliminating the burden of supporting a class of absentee investors. By lowering the threshold of capital investment required to enter production, and easing the skids for self-employment at the expense of wage employment, the informal economy increases efficiency. Because producer-owned property must support only the laborer and his family, the rate of return required to make the employment of land and capital worthwhile is reduced. As a result, fewer productive resources are held out of use and there are more opportunities for productive labor.

The absentee ownership of capital skews investment in a different direction from what it would be in an economy of labor-owned capital, and reduces investment to lower levels. Investments that would be justified by the bare fact of making labor less onerous and increasing productivity, in an economy of worker-owned capital,⁴⁷ must produce an additional return on the capital to be considered worth making in an economy of rentiers. It is directly analogous to the holding of vacant land out of use that might enable laborers to subsist comfortably, because it will not in addition produce a rent over and above the laborer's subsistence. As Thomas Hodgskin observed in *Popular Political Economy*,

It is maintained... that labour is not productive, and, in fact, the labourer is not allowed to work, unless, in addition to replacing whatever he uses or consumes, and comfortably subsisting himself, his labour also gives a profit to the capitalist...; or unless his labour produces a great deal more... than will suffice for his own comfortable subsistence. Capitalists becoming the proprietors of all the wealth of the society... act on this principle, and never... will they suffer labourers to have the means of subsistence, unless they have a confident expectation that their labour will produce a profit over and above their own subsistence. This... is so completely the principle of slavery, to starve the labourer, unless his labour will feed his master as well as himself, that we must not be surprised if we should find it one of the chief causes... of the poverty and wretchedness of the labouring classes.⁴⁸

When capital equipment is owned by the same people who make and use it, or made and used by

46 Ibid., p. 191.

47 Thomas Hodgskin, *Popular Political Economy: Four Lectures Delivered at the London Mechanics' Institution* (New York: Augustus M. Kelley, 1966 [1827]), pp. 255-256.

48 Ibid., pp. 51-52.

different groups of people who divide the entire product according to their respective labor and costs, it is productive. But when capital equipment is owned by a class of rentiers separate from those who make it or use it, the owners may be said more accurately to impede production rather than "contribute" to it.

If there were only the makers and users of capital to share between them the produce of their co-operating labour, the only limit to productive labour would be, that it should obtain for them and their families a comfortable subsistence. But when in addition to this..., they must also produce as much more as satisfies the capitalist, this limit is much sooner reached. When the capitalist... will allow labourers neither to make nor use instruments, unless he obtains a profit over and above the subsistence of the labourer, it is plain that bounds are set to productive labour much within what Nature prescribes. In proportion as capital in the hands of a third party is accumulated, so the whole amount of profit required by the capitalist increases, and so there arises an artificial check to production and population. The impossibility of the labourer producing all which the capitalist requires prevents numberless operations, such as draining marshes, and clearing and cultivating waste lands; to do which would amply repay the labourer, by providing him with the means of subsistence, though they will not, in addition, give a large profit to the capitalist. In the present state of society, the labourers being in no case the owners of capital, every accumulation of it adds to the amount of profit demanded from them, and extinguishes all that labour which would only procure the labourer his comfortable subsistence.⁴⁹

Hodgskin developed this same theme, as it applied to land, in *The Natural and Artificial Right of Property Contrasted*:

It is, however, evident, that the labour which would be amply rewarded in cultivating all our waste lands, till every foot of the country became like the garden grounds about London, were all the produce of labour on those lands to be the reward of the labourer, cannot obtain from them a sufficiency to pay profit, tithes, rent, and taxes....

In the same manner as the cultivation of waste lands is checked, so are commercial enterprise and manufacturing industry arrested. Infinite are the undertakings which would amply reward the labour necessary for their success, but which will not pay the additional sums required for rent, profits, tithes, and taxes. These, and no want of soil, no want of adequate means for industry to employ itself, are the causes which impede the exertions of the labourer and clog the progress of society.⁵⁰

The administrative and transaction costs of conventional commercial economy have a similar effect to that of rentier incomes: they increase the number of people the laborer must support, in addition to himself, and thereby increase the minimum scale of output required for entering the market. The social economy enables its participants to evade the overhead costs of conventional organization, as described by Scott Burns in *The Household Economy*. The most enthusiastic celebrations of increased efficiencies from division of labor—like those at Mises.Org—tend to rely on illustrations in which, as Burns puts it, "labor can be directly purchased," or be made the object of direct exchange between the laborers themselves. But in fact,

[m]arketplace labor must not only bear the institutional burden of taxation, it must also carry the overhead costs of organization and the cost of distribution. Even the most direct service organizations charge two and one-half times the cost of labor. The accountant who is paid ten dollars an hour is billed out to clients at twenty-five dollars an hour... When both the general and the specific overhead burdens are considered, it

49 Ibid., pp. 243-244

50 Hodgskin, "Letter the Eighth: Evils of the Artificial Right of Property," *The Natural and Artificial Right of Property Contrasted. A Series of Letters, addressed without permission to H. Brougham, Esq. M.P. F.R.S.* (London: B. Steil, 1832). <http://oll.libertyfund.org/index.php?option=com_staticxt&staticfile=show.php%3Ftitle=323&layout=html>

becomes clear that any productivity that accrues to specialization is vitiated by the overhead burdens it must carry.

Consider, for example, what happens when an eight-dollar-an-hour accountant hires an eight-dollar-an-hour service repairman, and vice versa. The repairman is billed out by his company at two and one-half times his hourly wage, or twenty dollars; to earn this money, the accountant must work three hours and twenty minutes, because 25 per cent of his wages are absorbed by taxes. Thus, to be truly economically efficient, the service repairman must be at least three and one-third times as efficient as the accountant at repairing things.⁵¹

The same principle applies to exchange, with household and informal arrangements requiring far less in the way of administrative overhead than conventional retailers. Food buying clubs run out of people's homes, barter bazaars⁵² and freecycling networks, the imploding transaction costs of aggregating information and putting buyer and seller together on Craigslist, etc., all involve little or no overhead cost. Projects like FreeCycle, in fact, kill two birds with one stone: they simultaneously provide a low-overhead alternative to conventional retail, and maximize the efficiency with which the alternative economy extracts the last drop of value from the waste byproducts of capitalism.

To take just one example, consider the enormous cost of factoring in the apparel industry. Because most large retailers don't pay their apparel suppliers on time (delays of as much as six months are common), apparel producers must rely on factors to buy their accounts receivable at a heavy discount ("loan shark rates," in the words of Eric Husman, an engineer who blogs on lean manufacturing issues—typically 15-20%).⁵³ The requirement either to absorb several months' expenses while awaiting payment, or to get timely payment only at a steep discount, is an enormous source of added cost which exerts pressure to make it up on volume through large batch size. Now the large retailers, helpfully, are introducing a new "Supplier Alliance Program," which amounts to bringing the factoring operation in-house.⁵⁴ That's right: they actually "lend you the money they owe you" (in Husman's words). Technically, the retailers aren't actually lending the money, but rather extending their credit rating to cover your dealings with independent banks. The program is a response to the bankruptcy of several major factors in the recent financial crisis, and the danger that hundreds of vendors would go out of business in the absence of factoring. (Of course actually paying for orders on receipt would be beyond the meager resources of the poor big box chains.)

For the small apparel producer, in contrast, producing directly for an independent local retailer, for a local barter network, or for networked operations like Etsy, carries little or no overhead. Consider also the number of other industries in which something like the factoring system prevails (i.e., selling you, on credit, the rope to hang yourself with). A good example is the relationship Cargill and ADM have with family farmers: essentially a recreation of the 18th century putting-out system. Kathleen Fasanella, a consultant to the small apparel industry who specializes—among other things—in applying lean principles to apparel manufacturing, is for this reason an enthusiastic supporter of pull distribution networks (farmers selling at farmers' markets, craft producers selling on Etsy, etc.).⁵⁵

51 Scott Burns, *The Household Economy: Its Shape, Origins, & Future* (Boston: The Beacon Press, 1975), pp. 163-164.

52 Gul Tuysuz, "An ancient tradition makes a little comeback," *Hurriyet DailyNews*, January 23, 2009 <<http://www.hurriyet.com.tr/english/domestic/10826653.asp?scr=1>>.

53 Eric Husman, private email, November 18, 2009; Kathleen Fasanella, "Selling to Department Stores pt. 1," *Fashion Incubator*, August 11, 2009 <<http://www.fashion-incubator.com/archive/selling-to-department-stores-pt1/>>.

54 "Supply Chain News: Walmart Joins Kohl's in Offering Factoring Program to Apparel Suppliers," *Supply Chain Digest*, November 17, 2009 <http://www.scdigest.com/ASSETS/ON_TARGET/09-11-17-2.PHP?cid=2954&ctype=conte>.

55 Kathleen Fasanella, private email, November 19, 2009. Fasanella wrote the best-known book in the industry on how to start an apparel company: *The Entrepreneur's Guide to Sewn Product Manufacturing* (Apparel Technical Svcs, 1998). Eric Husman also happens to be her husband.

The shift to dispersed production in countless micro-enterprises also makes the alternative economy far less vulnerable to state taxation and imposition of artificial levels of overhead. In an economy of large-scale, conventional production, the required scale of capital outlays and resulting visibility of enterprises provides a physical hostage for the state's enforcement of overhead-raising regulations and “intellectual property” laws.

The conventional enterprise also provides a much larger target for taxation, with much lower costs for enforcement, which is another reason the state tends to favor large enterprises and exists in a symbiotic relationship with them.⁵⁶ But as required physical capital outlays implode, and conventional manufacturing melts into a network of small machine shops and informal/household “hobby” shops, the targets become too small and dispersed to bother with.

This effect of rentier income, by the way, is just another example of a broader phenomenon we have been observing in various guises throughout this book: the effect of any increase in the minimum capital outlay, overhead, etc., to carry out a function, is to increase the scale of production necessary to service fixed costs. Overhead is a baffle that disrupts the flow from effort to output, and has an effect on the productive economy comparable to that of constipation or edema on the human body.

The Singularity

The cumulative effect of all these superior efficiencies of peer production, and of the informal and household economy, is to create a singularity.

The problem, for capital, is that—as we saw in the previous papers of this series—the miniaturization and cheapness of physical capital, and the emergence of networked means of aggregating investment capital, are rendering capital increasingly superfluous.

The resulting crisis of realization is fundamentally threatening. Not only is capital superfluous in the immaterial realm, but the distinction between the immaterial and material realms is becoming increasingly porous. Material production, more and more, is taking on the same characteristics that caused the desktop computer to revolutionize production in the material realm.

The technological singularity means that labor is ceasing to depend on capital, and on wage employment by capital, for its material support.

For over two centuries, as Immanuel Wallerstein observed, the system of capitalist production based on wage labor has depended on the ability to externalize many of its reproduction functions on the non-monetized informal and household economies, and on organic social institutions like the family which were outside the cash nexus.

Historically, capital has relied upon its superior bargaining power to set the boundary between the money and social economies to its own advantage. The household and informal economies have been allowed to function to the extent that they bear reproduction costs that would otherwise have to be internalized in wages; but they have been suppressed (as in the Enclosures) when they threaten to

⁵⁶ See, for example, Benjamin Darrington, “Government Created Economies of Scale and Capital Specificity” (Austrian Student Scholars' Conference, 2007) pp. 6-7

<http://agorism.info/_media/government_created_economies_of_scale_and_capital_specificity.pdf>.

increase in size and importance to the point of offering a basis for independence *from* wage labor.

The employing classes' fear of the subsistence economy made perfect sense. For as Kropotkin asked:

If every peasant-farmer had a piece of land, free from rent and taxes, if he had in addition the tools and the stock necessary for farm labour—Who would plough the lands of the baron? Everyone would look after his own....

If all the men and women in the countryside had their daily bread assured, and their daily needs already satisfied, who would work for our capitalist at a wage of half a crown a day, while the commodities one produces in a day sell in the market for a crown or more?⁵⁷

"The household as an income-pooling unit," Wallerstein writes, "can be seen as a fortress both of accommodation to and resistance to the patterns of labor-force allocation favored by accumulators." Capital has tended to favor severing the nuclear family household from the larger territorial community or extended kin network, and to promote an intermediate-sized income-pooling household. The reason is that too small a household falls so far short as a basis for income pooling that the capitalist is forced to commodify too large a portion of the means of subsistence, i.e. to internalize the cost in wages.⁵⁸ It is in the interest of the employer not to render the worker *totally* dependent on wage income, because without the ability to carry out some reproduction functions through the production of use value within the household subsistence economy, the worker will be "compelled to demand higher real wages...."⁵⁹ On the other hand, too large a household meant that "the level of work output required to ensure survival was too low," and "diminished pressure to enter the wage-labor market."⁶⁰

It's only common sense that when there are multiple wage-earners in a household, their dependence on any one job is reduced, and the ability of each member to walk away from especially onerous conditions is increased. The family may be just as dependent on wage labor in general, but is significantly less vulnerable to the unemployment of any particular member. And in fact it is less dependent on wage labor in general, to the extent that the per capita overhead of fixed expenses to be serviced falls as household size increases. And the absolute level of fixed expenses can also be reduced by partially and incrementally substituting the household economy for wage employment, as the locus of value creation. As we saw Borsodi put it in the previous paper, "[a] little money, where wages are joined to the produce of the soil, will go a long way...."

The new factor today is a revolutionary shift in competitive advantage from wage labor to the informal economy. The rapid growth of technologies for home production, based on small-scale electrically powered machinery and new forms of intensive cultivation, has radically altered the comparative efficiencies of large- and small-scale production. This was pointed out by Borsodi almost eighty years ago, and the trend has continued since. The current explosion in low-cost manufacturing technology promises to shift competitive advantage in the next decade much more than in the entire previous century.

57 Peter Kropotkin, *The Conquest of Bread* (New York: Vanguard Press, 1926), pp. 36-37.

58 Immanuel Wallerstein, "Household Structures and Labor-Force Formation in the Capitalist World Economy," in Joan Smith, Immanuel Wallerstein, Hans-Dieter Evers, eds., *Households and the World Economy* (Beverly Hills, London, New Delhi: Sage Publications, 1984), pp. 20-21.

59 Wallerstein and Joan Smith, "Households as an institution of the world-economy," in Smith and Wallerstein, eds., *Creating and Transforming Households: The constraints of the world-economy* (Cambridge; New York; Oakleigh, Victoria; Paris: Cambridge University Press, 1992), p. 16.

60 Wallerstein, "Household Structures," p. 20.

The practical choice presented to labor by this shift of comparative advantage was ably stated by Marcin Jakubowski, whose Factor E Farm is one of the most notable attempts to integrate open manufacturing and digital fabrication with an open design repository:

Friends and family still harass me. They still keep telling me to 'get a real job.' I've got a good response now. It is:

1. Take a look at the last post on the soil pulverizer
2. Consider 'getting a real job at \$100k,' a well-paid gig in The System. Tax and expense take it down to \$50k, saved, if you're frugal.

Ok. I can 'get a real job', work for 6 months, and then buy a Soil Pulverizer for \$25k. Or, I make my own in 2 weeks at \$200 cost, and save the world while I'm at it.

Which one makes more sense to you? You can see which one makes more sense to me. It's just economics.⁶¹

In other words, how ya gonna keep 'em down in the factory, when the cost of getting your own garage factory has fallen to two months' wages?

As James O'Connor described the phenomenon in the 1980s, "the accumulation of stocks of means and objects of reproduction within the household and community took the edge off the need for alienated labor."

Labor-power was hoarded through absenteeism, sick leaves, early retirement, the struggle to reduce days worked per year, among other ways. Conserved labor-power was then expended in subsistence production.... The living economy based on non- and anti-capitalist concepts of time and space went underground: in the reconstituted household; the commune; cooperatives; the single-issue organization; the self-help clinic; the solidarity group. Hurrying along the development of the alternative and underground economies was the growth of underemployment... and mass unemployment associated with the crisis of the 1980s. "Regular" employment and union-scale work contracted, which became an incentive to develop alternative, localized modes of production....

...New social relationships of production and alternative employment, including the informal and underground economies, threatened not only labor discipline, but also capitalist markets.... Alternative technologies threatened capital's monopoly on technological development... Hoarding of labor-power threatened capital's domination of production. Withdrawal of labor-power undermined basic social disciplinary mechanisms....⁶²

More recently, "Eleutheros," of *How Many Miles from Babylon?* blog, described the sense of freedom that results from a capacity for independent subsistence:

...if we padlocked the gate to this farmstead and never had any trafficking with Babylon ever again, we could still grow corn and beans in perpetuity....

What is this low tech, low input, subsistence economy all about, what does it mean to us? It is much like Jack Sparrow's remark to Elizabeth Swann when... he told her what the Black Pearl really was, it was

61 Marcin Jakubowski, "Get a Real Job!" *Factor E Farm Weblog*, September 7, 2009 <<http://openfarmtech.org/weblog/?p=1067>>.

62 James O'Connor, *Accumulation Crisis* (New York: Basil Blackwell, 1984), pp. 184-186.

freedom. Like that to us our centuries old agriculture represents for us a choice. And having a choice is the very essence and foundation of our escape from Babylon.

...To walk away from Babylon, you must have choices.... Babylon, as with any exploitative and controlling system, can only exist by limiting and eliminating your choices. After all, if you actually have choices, you may in fact choose the things that benefit and enhance you and your family rather than things that benefit Babylon.

Babylon must eliminate your ability to choose....

So I bring up my corn field in way of illustration of what a real choice looks like. We produce... our staple bread with no input at all from Babylon. So we always have the choice to eat that instead of what Babylon offers. We also buy wheat in bulk and make wheat bread sometimes, but if (when, as it happened this year) the transportation cost or scarcity of wheat makes the price beyond the pale, we can look at it and say, "No, not going there, we will just go home and have our cornbread and beans." Likewise we sometimes buy food from stands and stores, and on a few occasions we eat out. But we always have the choice, and if we need to, we can enforce that choice for months on end....

Your escape from Babylon begins when you can say, "No, I have a choice. Oh, I can dine around Babylon's table if I choose, but if the Babylonian terms and conditions are odious, then I don't have to."⁶³

And the payoff doesn't require a total economic implosion. This is a winning strategy even if the money economy and division of labor persist indefinitely to a large extent—as I think they almost surely will—and most people continue to get a considerable portion of their consumption needs through money purchases. The end-state, after Peak Oil and the other terminal crises of state capitalism have run their course, is apt to bear a closer resemblance to Warren Johnson's *Muddling Toward Frugality* and Brian Kaller's "Return to Mayberry" than Jim Kunstler's *World Made by Hand*. The knowledge that you are debt-free and own your living space free and clear, and that you could keep a roof over your head and food on the table without wage labor indefinitely, if you had to, has an incalculable effect on your bargaining power here and now, even while capitalism persists.

As Ralph Borsodi observed almost eighty years ago, his ability to "retire" on the household economy for prolonged periods of time—and potential employers' knowledge that he could do so—enabled him to negotiate far better terms for what outside work he did decide to accept. He described, from his own personal experience, the greatly increased bargaining power of labor when the worker has the ability to walk away from the table:

...Eventually income began to go up as I cut down the time I devoted to earning money, or perhaps it would be more accurate to say I was able to secure more for my time as I became less and less dependent upon those to whom I sold my services.... This possibility of earning more, by needing to work less, is cumulative and is open to an immense number of professional workers. It is remarkable how much more appreciative of one's work employers and patrons become when they know that one is independent enough to decline unattractive commissions. And of course, if the wage-earning classes were generally to develop this sort of independence, employers would have to compete and bid up wages to secure workers instead of workers competing by cutting wages in order to get jobs.⁶⁴

...Economic independence immeasurably improves your position as a seller of services. It replaces the

63 Eleutheros, "Choice, the Best Sauce," *How Many Miles from Babylon*, October 15, 2008 <<http://milesfrombabylon.blogspot.com/2008/10/choice-best-sauce.html>>.

64 Borsodi, *Flight From the City: An Experiment in Creative Living on the Land* (New York, Evanston, San Francisco, London: Harper & Row, 1933, 1972), p. 100.

present "buyer's market" for your services, in which the buyer dictates terms with a "seller's market," in which you dictate terms. It enables you to pick and choose the jobs you wish to perform and to refuse to work if the terms, conditions, and the purposes do not suit you. The next time you have your services to sell, see if you cannot command a better price for them if you can make the prospective buyer believe that you are under no compulsion to deal with him.⁶⁵

...[T]he terms upon which an exchange is made between two parties are determined by the relative extent to which each is free to refuse to make the exchange.... The one who was "free" (to refuse the exchange), dictated the terms of the sale, and the one who was "not free" to refuse, had to pay whatever price was exacted from him.⁶⁶

Colin Ward, in "Anarchism and the informal economy," envisioned a major shift from wage labor to the household economy:

[Jonathan Gershuny of the Science Policy Research Unit at Sussex University] sees the decline of the service economy as accompanied by the emergence of a self-service economy in the way that the automatic washing machine in the home can be said to supersede the laundry industry. His American equivalent is Scott Burns, author of *The Household Economy*, with his claim that 'America is going to be transformed by nothing more or less than the inevitable maturation and decline of the market economy. The instrument for this positive change will be the household—the family—revitalized as a powerful and relatively autonomous productive unit'.

The only way to banish the spectre of unemployment is to break free from our enslavement to the idea of employment....

The first distinction we have to make then is between work and employment. The world is certainly short of jobs, but it has never been, and never will be, short of work.... The second distinction is between the regular, formal, visible and official economy, and the economy of work which is not employment....

...Victor Keegan remarks that 'the most seductive theory of all is that what we are experiencing now is nothing less than a movement back towards an informal economy after a brief flirtation of 200 years or so with a formal one'.

We are talking about the movement of work back into the domestic economy....⁶⁷

Burns, whom Ward cited above, saw the formation of communes, the buying of rural homesteads, and other aspects of the back to the land movement, as an attempt

to supplant the marketplace entirely. By building their own homes and constructing them to minimize energy consumption, by recycling old cars or avoiding the automobile altogether, by building their own furniture, sewing their own clothes, and growing their own food, they are minimizing their need to offer their labor in the marketplace. They pool it, instead, in the extended household.... [T]he new homesteader can internalize 70-80 per cent of all his needs in the household; his money work is intermittent when it can't be avoided altogether.⁶⁸

To reiterate: we're experiencing a singularity in which it is becoming impossible for capital to prevent a shift in the supply of an increasing proportion of the necessities of life from mass produced goods purchased with wages, to small-scale production in the informal and household sector. The

65 Borsodi, p. 335.

66 Ibid., p. 403.

67 Colin Ward, "Anarchism and the informal economy," *The Raven* No. 1 (1987), pp. 27-28.

68 Burns, *The Household Economy*, p. 47.

upshot is likely to be something like Vinay Gupta's "Unplugged" movement, in which the possibilities for low-cost, comfortable subsistence off the grid result in exactly the same situation, the fear of which motivated the propertied classes in carrying out the Enclosures: a situation in which the majority of the public can take wage labor or leave it, if it takes it at all, the average person works only on his own terms when he needs supplemental income for luxury goods and the like, and (even if he considers supplemental income necessary in the long run for an optimal standard of living) can afford in the short run to quit work and live off his own resources for prolonged periods of time, while negotiating for employment on the most favorable terms. It will be a society in which workers, not employers, have the greater ability to walk away from the table. It will, in short, be the kind of society Wakefield lamented in the colonial world of cheap and abundant land: a society in which labor is hard to get on any terms, and almost impossible to hire at a low enough wage to produce significant profit.

Gupta's short story "The Unplugged"⁶⁹ related his vision of how such a singularity would affect life in the West.

To "get off at the top" requires millions and millions of dollars of stored wealth. Exactly how much depends on your lifestyle and rate of return, but it's a lot of money, and it's volatile depending on economic conditions. A crash can wipe out your capital base and leave you helpless, because all you had was shares in a machine.

So we Unpluggers found a new way to unplug: an independent life-support infrastructure and financial architecture—a society within society—which allowed anybody who wanted to "buy out" to "buy out at the bottom" rather than "buying out at the top."

If you are willing to live as an Unplucker does, your cost to buy out is only around three months of wages for a factory worker, the price of a used car. You never need to "work" again—that is, for money which you spend to meet your basic needs.

The more technical advances lower the capital outlays and overhead for production in the informal and household economy, the more the economic calculus is shifted in the way described by Jakubowski above.

The basic principle of Unplugging was to combine "Gandhi's Goals" ("self-sufficiency," or "the freedom that comes from owning your own life support system") with "Fuller's Methods" (getting more from less). Such freedom

allows us to disconnect from the national economy as a way of solving the problems of our planet one human at a time. But Gandhi's goals don't scale past the lifestyle of a peasant farmer and many westerners view that way of life as unsustainable for them personally....

Fuller's "do more with less" was a method we could use to attain self-sufficiency with a much lower capital cost than "buy out at the top." An integrated, whole-systems-thinking approach to a sustainable lifestyle—the houses, the gardening tools, the monitoring systems—all of that stuff was designed using inspiration from Fuller and later thinkers inspired by efficiency. The slack—the waste—in our old ways of life were consuming 90% of our productive labor to maintain.

A thousand dollar a month combined fuel bill is your life energy going down the drain because the place you live sucks your life way [sic] in waste heat, which is waste money, which is waste time. Your car, your house, the portion of your taxes which the Government spends on fuel, on electricity, on waste heat... all of the time you spent to earn that money is wasted to the degree those systems are inefficient systems, behind

69 Vinay Gupta, "The Unplugged," How to Live Wiki, February 20, 2006 <http://howtolivewiki.com/en/The_Unplugged>.

best practices!

James L. Wilson, in a vignette of family life in the mid-21st century, writes of ordinary people seceding from the wage system and meeting as many of their needs as possible locally, primarily as a response to the price increases from Peak Oil—but in so doing, also regaining control of their lives and ending their dependence on the corporation and the state.

"Well, you see all these people working on their gardens? They used to not be here. People had grass lawns, and would compete with each other for having the greenest, nicest grass. But your grandma came home from the supermarket one day, sat down, and said, 'That's it. We're going to grow our own food.' And the next spring, she planted a vegetable garden where the grass used to be.

"And boy, were some of the neighbors mad. The Homeowners Association sued her. They said the garden was unsightly. They said that property values would fall. But then, the next year, more people started planting their own gardens.

"And not just their lawns. People started making improvements on their homes, to make them more energy-efficient. They didn't do it to help the environment, but to save money. People in the neighborhood started sharing ideas and working together, when before they barely ever spoke to each other....

"And people also started buying from farmer's markets, buying milk, meat, eggs and produce straight from nearby farmers. This was fresher and healthier than processed food. They realized they were better off if the profits stayed within the community than if they went to big corporations far away.

"This is when your grandma, my Mom, quit her job and started a bakery from home. It was actually in violation of the zoning laws, but the people sided with grandma against the government. When the government realized it was powerless to crack down on this new way of life, and the people realized they didn't have to fear the government, they became free. And so more and more people started working from home. Mommies and Daddies used to have different jobs in different places, but now more and more of them are in business together in their own home, where they're close to their children instead of putting them in day care."....⁷⁰

Conclusion

We have seen throughout this chapter the superiority of the alternative economy, in terms of a number of different conceptual models—Robb's STEMI compression, Ceesay's economies of agility, Gupta's distributed infrastructure, and Cravens' productive recursion—to the corporate capitalist economy. All these superiorities can be summarized as the ability to make better use of material inputs than capitalism, and the ability to make use of the waste inputs of capitalism.

David Pollard describes, as one way of bringing about major global change, "incapacitation—rendering the old order unable to function by sapping what it needs to survive."⁷¹

But suppose if, instead of waiting for the collapse of the market economy and the crumbling of the power elite, we brought about that collapse, guerrilla-style, by making information free, by making local communities energy self-sufficient, and by taking the lead in biotech away from government and corporatists

⁷⁰ James L. Wilson, "Standard of Living vs. Quality of Life," *The Partial Observer*, May 29, 2008 <<http://www.partialobserver.com/article.cfm?id=2955&RSS=1>>.

⁷¹ David Pollard, "All About Power and the Three Ways to Topple It (Part 1)," *How to Save the World*, February 18, 2005 <<http://blogs.salon.com/0002007/2005/02/18.html>>.

(the power elite) by working collaboratively, using the Power of Many, Open Source, unconstrained by corporate allegiance, patents and 'shareholder expectations'?"⁷²

In short, we undermine the old corporate order, not by the people we elect to Washington, or the policies those people make, but by how we do things where we live. A character in Marge Piercy's *Woman on the Edge of Time*, describing the revolution that led to her future decentralist utopia, summed it up perfectly. Revolution, she said, was not uniformed parties, slogans, and mass-meetings. "It's the people who worked out the labor-and-land intensive farming we do. It's all the people who changed how people bought food, raised children, went to school!Who made new unions, withheld rent, refused to go to wars, wrote and educated and made speeches."⁷³

Localized, small-scale economies are the rats in the dinosaurs' nests. The informal and household economy operates more efficiently than the capitalist economy, and can function on the waste byproducts of capitalism. It is resilient and replicates virally. In an environment in which resources for technological development have been almost entirely diverted toward corporate capitalism, it takes technologies that were developed to serve corporate capitalism, adapts them to small-scale production, and uses them to destroy corporate capitalism. In fact, it's almost as though the dinosaurs themselves had funded a genetic research lab to breed mammals: "Let's reconfigure the teeth so they're better for sucking eggs, and ramp up the metabolism to survive a major catastrophe—like, say, an asteroid collision. Nah, I *don't* really know what it would be good for—but what the fuck, the Pangean Ministry of Defense is paying for it!"

To repeat, there are two economies competing: their old economy of bureaucracy, high overhead, enormous capital outlays, and cost-plus markup, and our new economy of agility and low overhead. And in the end... we will bury them.

Appendix: The Singularity in the Third World

If the coming singularity will enable the producing classes in the industrialized West to defect from the wage system, in the Third World it may enable them to skip that stage of development altogether. Gupta concluded "The Unplugged" with a hint about how the principle might be applied in the Third World: "We encourage the developing world to Unplug as the ultimate form of Leapfrogging: skip hypercapitalism and anarchocapitalism and democratic socialism entirely and jump directly to Unplugging."

Gupta envisions a corresponding singularity in the Third World when the cost of an Internet connection, through cell phones and other mobile devices, falls low enough to be affordable by impoverished villagers. At that point, the transaction costs which hampered previous attempts at disseminating affordable intermediate technologies in the Third World, like Village Earth's Appropriate Technology Library or Schumacher's Intermediate Technology Development Group, will finally be overcome by digital network technology.

It is inevitable that the network will spread everywhere across the planet, or very nearly so. Already the cell phone has reached 50% of the humans on the planet. As technological innovation transforms the ordinary cell phone into a little computer, and ordinary cell services into connections to the Internet, the

⁷² Pollard, "All About Power--Part Two," *How to Save the World*, February 21, 2005
<<http://blogs.salon.com/0002007///2005/02/21.html>>.

⁷³ Marge Piercy, *Woman on the Edge of Time* (New York: Fawcett Columbine, 1976), p. 190.

population of the internet is going to change from being predominantly educated westerners to being mainly people in poorer countries, and shortly after that, to being predominantly people living on a few dollars a day....

...Most people are very poor, and as the price of a connection to the Internet falls to a level they can afford, as they can afford cell phones now, we're going to get a chance to really help these people get a better life by finding them the information resources they need to grow and prosper.

Imagine that you are a poor single mother in South America who lives in a village without a clean water source. Your child gets sick now and again from the dirty water, and you feel there is nothing you can do, and worry about their survival. Then one of your more prosperous neighbors gets a new telephone, and there's a video which describes how to purify water [with a solar purifier made from a two-liter soda bottle]. It's simple, in your language, and describes all the basic steps without showing anything which requires schooling to understand. After a while, you master the basic practical skills--the year or two of high school you caught before having the child and having to work helps. But then you teach your sisters, and none of the kids get sick as often as they used to... life has improved because of the network.

Then comes solar cookers, and improved stoves, and preventative medicine, and better agriculture [earlier Gupta mentions improved green manuring techniques], and diagnosis of conditions which require a doctor's attention, with a GPS map and calendar of when the visiting doctors will be in town again.⁷⁴

The revolution is already here, according to a *New York Times* story. Cell phones, with service plans averaging \$5 a month, have already spread to a third of the population of India. That means that mobile phones, with Internet service, have "seeped down the social strata, into slums and small towns and villages, becoming that rare Indian possession to traverse the walls of caste and region and class; a majority of subscribers are now outside the major cities and wealthiest states." And the mushrooming growth of cell phone connections, 15 million in March 2009, amounts to something like a 45% annual growth rate over the 400 million currently in use—a rate which, if it continues, will mean universal cell phone ownership within five years.⁷⁵

74 Vinay Gupta, "What's Going to Happen in the Future," *The Bucky-Gandhi Design Institution*, June 1, 2008 <<http://vinay.howtolivewiki.com/blog/global/whats-going-to-happen-in-the-future-670>>.

75 Anand Giridhardas, "A Pocket-Size Leveler in an Outsized Land," *New York Times*, May 9, 2009 <<http://www.nytimes.com/2009/05/10/weekinreview/10giridhardas.html?ref=world>>.