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# Introduction to the C4SS Edition of *Fields, Factories and Workshops Tomorrow*

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This book is actually a heavily abridged version of Kropotkin's *Fields, Factories and Workshops*, edited by Colin Ward with a lot of his commentary thrown in. And to top it all off, the C4SS edition throws in Murray Bookchin's essay "Towards a Liberatory Technology" from the book *Post-Scarcity Anarchism*.

So when C4SS Director James Tuttle asked me to write an introduction, I felt like I'd hit the trifecta. I read Kropotkin's original version, the Ward commentaries, and Bookchin's essay all around roughly the same time, along with other writings by Ward on neighborhood workshops as a means of communal self-provisioning by the unemployed and underemployed, and similar ideas by Karl Hess in his and Morris's book *Neighborhood Government*. Their ideas all clicked together for me and produced the conceptual framework that I expressed first in Chapter 14 of my book *Organization Theory*, and then grew into a book of its own with the publication of *The Homebrew Industrial Revolution*.

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It was also a pleasant surprise because Ward and Kropotkin are two among several anarchist thinkers I'm writing a series of appreciations on for C4SS. Both Kropotkin and Ward were libertarian communists of sorts, but there was so much sheer muchness to their thought it's impossible to encapsulate with any such ideological label. Compared to their love for the irreducible particularity of all the near-infinity of local examples of human-scale self-organization and cooperation, labels like "communist," "individualist" or "syndicalist" are like stale bread crusts.

Kropotkin was much like William Morris in his affection for the free towns of the High Middle Ages, and all the horizontally organized fraternal associations for mutual aid and solidarity within them. Like Morris, much of his fondness was purely aesthetic – for the beauty and craftsmanship that surrounded most townspeople's lives – not to mention a material standard of living, in terms of the purchasing power of labor, that would not be reached again in the modern age for over four hundred years. His faith in the human capacity for mutual aid and cooperation, and in the ability of ordinary, face-to-face groupings of people on the spot to develop workable arrangements among themselves, was coupled with a love for all the unique and quaint things buried in the nooks and crannies of history: folknotes, nineteenth century mutuals and friendly societies, and the open-field villages that survived into modern times in some parts of Europe. This reverence both for the positive side of human nature and for the infinite variety of its flesh-and-blood expressions could not be reduced to any ideological formulation or "ism."

Ward had this same quality in high degree. Among his best scholarly works are historical surveys of self-organized alternative schools, cooperative healthcare through friendly societies and other mutuals, and self-built unconventional housing. For Ward, anarchism wasn't a doctrinaire theoretical model prescribing the kinds of institutions to be built after the Revolution. It was a description of the endless variety of things people are doing right

now, on their own, without waiting for the Revolution or for anarchist theoreticians to stamp their imprimatur on it.

As for the actual book, Kropotkin's *Fields, Factories and Workshops* and Colin Ward's commentary – as well as Bookchin's essay, which is appended to the C4SS edition – are uniquely suited to each other. *Fields, Factories and Workshops* was a book on the decentralizing potential of electrical power in industry – a common theme at that time. And the work on neighborhood and garage industry by Ward, Bookchin and Hess was in many ways a rediscovery of this potential nearly a century after it was thwarted by capital in league with the state.

To see the significance of the technological revolution Kropotkin explored in this book, we need to step back and take a look at what came before. In the age of steam and water power – what Lewis Mumford called the Paleotechnic Era – large centralized factories resulted from the need to conserve on power from prime movers. Steam engines were governed by fairly steep economies of scale, so that the unit cost of generating power got smaller the bigger the engine was. So it made sense to build a large steam engine and run as much production machinery off it as possible. That meant mills full of machines all lined up in rows, powered by pulleys running from a common drive shaft.

Electrically powered machinery offered the potential to end all this. With the invention of the electric motor, it was possible to build a separate prime mover into each machine, and to locate the machines where the output was needed. So instead of a giant factory at a centralized location, producing in large quantities for long-distance distribution, it would be possible to introduce a decentralized economy of lean production for local markets. Individual machines could be scaled to production flow, production flow could be scaled to demand, and the entire production process could be sited as closely as possible to the point of final consumption. This would mean small-scale shops with electrically powered, general-purpose machinery integrated into craft production, turning out

a wide variety of products and frequently switching between production lines, on a demand-pull basis for local markets. Lean, agile and low-overhead.

This is essentially the economy Kropotkin described in *Fields, Factories and Workshops*: Local communities with small-scale manufacturing shops, the blurring between town and country as manufacturing and soil-intensive horticulture were integrated into village economies, and the blurring between intellectual and manual labor as production shifted from deskilled proletarians as appendages of machines to machines run by skilled craft workers.

Mumford referred to this new industrial era, centered on electrical power, as the Neotechnic. And Ward quotes him in his introduction to this book. Kropotkin, Mumford wrote,

grasped the fact that the flexibility and adaptability of electric communication and electric power, along with the possibilities of intensive biodynamic farming, had laid the foundations for a more decentralized urban development in small units, responsive to direct human contact, and enjoying both urban and rural advantages.

Kropotkin realised that the new means of rapid transit and communication, coupled with the transmission of electrical power in a network, rather than a one-dimensional line, made the small community on a par in essential technical facilities with the over-congested city. By the same token, rural occupations once isolated and below the economic and cultural level of the city could have the advantage of scientific intelligence, group organisation, and animated activities...; and with this the hard and fast division between urban and rural, between industrial worker and farm worker, would break down too.

Most agriculture would take on the nature of horticulture, with raised-bed gardens and small manufacturing shops integrated into

produce and cheese off the tables as fast as it's placed there at the farmer's market. Ornamental lawns will be replaced by intensive gardens and edible landscaping, and home baking, brewing or sewing skills will be a valuable means not only of supplying oneself but of obtaining surplus goods in trade from the neighbors.

This will all be done, not through some centralized agenda, but through the spontaneous learning curve of the people themselves in the face of necessity. As Kropotkin said of the Bolshevik dictatorship's attempt at imposing a revolution from above a century ago:

...it is impossible to achieve such a revolution by means of dictatorship and state power. Without a widespread reconstruction coming from below—put into practice by the workers and peasants themselves, the social revolution is condemned to bankruptcy.... [W]e must hope that... serious efforts will be made to create within the working class—peasants, workers and intellectuals—the personnel of a future revolution which will not obey orders from above but will be capable of elaborating for itself the free forms of the whole new economic life.

Friends, we are creating this revolution today.

village and small town economies. And in place of the factory worker, repeating the same operation over and over, there would be once again the craft worker of many-faceted skills, schooled in the scientific and engineering principles of her craft and applying critical intelligence to her work. It would be a return to the skilled master craft workers of the pre-industrial era – like, e.g., the printers and weavers who supplied so much of the working class intelligentsia of the early radical movements. With radically shortened work weeks of ten or fifteen hours, the whole idea of a full-time occupation would wither away, and instead the average villager might devote a few hours to working in the shop, a few more to pleasant garden chores, but most of all to leisure, conviviality and learning – much like Marx's fully actualized human being in the communist future, who no longer “has one exclusive sphere of activity but... [can] to do one thing today and another tomorrow, to hunt in the morning, fish in the afternoon, rear cattle in the evening, criticize after dinner, just as I have a mind, without ever becoming hunter, fisherman, shepherd or critic.”

Here's Kropotkin's description:

Have the factory and the workshop at the gates of your fields and gardens, and work in them. Not those large establishments, of course, in which huge masses of metals have to be dealt with and which are better placed at certain spots indicated by Nature, but the countless variety of workshops and factories which are required to satisfy the infinite diversity of tastes among civilized men. Not those factories in which children lose all the appearance of children in the atmosphere of an industrial hell, but those airy and hygienic, and consequently economical, factories in which human life is of more account than machinery and the making of extra profits, of which we already

find a few examples here and there; factories and workshops into which men, women and children will not be driven by hunger, but will be attracted by the desire of finding an activity suited to their tastes, and where, aided by the motor and the machine, they will choose the branch of activity which best suits their inclinations.

Although this would have been the ideal industrial application of electrical power, from the standpoint of best utilizing its potential, that wasn't to be. Instead, in the United States at least, the state tipped the balance with policies like the railroad land grants, industrial patents, tariffs and imperialism that made large-scale mass production artificially competitive against more efficient small-scale production. The result was not only the industrial gigantism of the 20th century, but a whole host of state measures aimed at remedying the problems of excess production capacity, surplus investment capital and inadequate demand that plagued the overbuilt corporate economy. These measures included enormous infrastructure projects like the civil aviation and Interstate Highway systems as capital sinks, as well as the Military-Industrial Complex and the state-subsidized car culture.

Mumford called it the "cultural pseudomorph," after the tendency of minerals in the fossilization process to leach into the remains of a buried organism and take on its preexisting shape: instead of the new technology taking its ideal form and fully realizing its potential, it was instead coopted into the preexisting Paleotechnic institutional framework of the Dark Satanic Mills. So instead of small-scale craft production with general-purpose machinery, serving local markets, we had a mass-production economy of extremely expensive, capital-intensive product-specific machinery, which had to be run at full capacity day and night to amortize the capital outlays and minimize unit costs. To paraphrase Marx: "Uti-

competitive with small-scale production. The difference today is that even the state's maximum feasible assistance is not enough to prop up the corporate dinosaurs. The state simply cannot provide subsidized production inputs on the scale required by big business, or spend on a scale required to absorb its excess output, without bankrupting itself. And because of advances in technology that render monopolies like "intellectual property" unenforceable, it lacks the capability to suppress competition by small producers outside the corporate framework.

As corporate capitalism continues to decay, and input crises like Peak Oil continue to increase transportation costs, we can expect a growing share of food production to be relocalized and industrial supply and distribution chains to be radically shortened.

We can plausibly speculate that relocalized, integrated industrial economies will come about through something like Jane Jacobs' "import substitution" model. As Jacobs described the origins of the Japanese bicycle industry a century ago, it resulted from the need for cheap, locally produced spare parts. The bicycles were imported from Europe and the United States, and the manufacturers were unwilling to locate factories in Japan. So bicycle shops would get into the business of custom machining replacement parts for their customers. Individual shops would specialize in different parts, and they gradually began to network together and developed the capability between them to assemble a larger and larger share of a total bicycle, until finally bicycles were produced locally by a sort of flexible manufacturing network.

Similarly, as the rising cost of fuel for container-ships and trucks causes outsourced industrial supply chains to break down, people will increasingly turn to their neighbors' workshops to custom-machine the replacement parts needed to keep their appliances going. Local re-industrialization will proceed from there.

When diesel fuel is \$15 or \$20 a gallon and the supermarket shelves are usually mostly empty, likewise, people will snatch

This was the beginning of what Sabine and Piore called the “Second Industrial Divide” (the first one had been when Western economies chose between the Kropotkinian and mass-production models of industrialization and made the wrong choice). After a near century-long detour, industrial production was returning to the original promise of electrical power – but on an even higher level.

The problem was that, in the model of the ’80s and ’90s, while the production process itself was becoming somewhat more Kropotkinian or Mumfordian, it was still integrated into a centralized corporate framework when it came to finance, distribution and marketing. Transnational corporations managed this, even though a growing share of actual production was outsourced to small job-shops, by retaining control over “intellectual property.” So while sweatshops in Asia manufactured sneakers at a cost of a few bucks a pair, Nike’s trademark enabled it to function as a monopsonist – the only legal buyer for the output – and move the sneakers by container ship and semi truck to American retail chains, where it charged a 10,000% markup over the cost of production.

And with the turn of the 21st century came another revolution in downscaling and cheapening production technology of the same order of magnitude as that of the 1970s. This time the revolution open-source tabletop machine tools made it possible to produce routers, cutting tables, lathes, 3-D scanners and printers, etc., for less than \$1000 each – ten times cheaper than their commercial predecessors of a decade earlier. This meant a garage shop with ten or twenty thousand dollars worth of machinery could produce goods of the same sort that once required a million-dollar factory.

So regardless of talk about “economies of scale,” mass production has never really been more efficient than small-scale craft industry, since (at least!) the development of electrically powered machinery in the late 19th century. Mass-production industry has always required the state to tip the balance and make it artificially

lize capacity, utilize capacity, utilize capacity; this is the law and the prophets.”

This meant production had to be undertaken entirely independently of, and without regard to, preexisting demand; and then the social system had to be organized around finding ways to compel people to consume the stuff produced whether they wanted it or not, lest the system become glutted with rising inventories and the wheels of industry cease to spin. So it was a society of mass consumption propaganda, planned obsolescence, and endless state-subsidized infrastructure projects and imperial wars to soak up excess capital, destroy surplus production capacity and remedy overproduction with overseas dumping.

But even at the height of the mass-production age – the age of Galbraith, Schumpeter and Chandler – there remained apostles of economic decentralism like Ralph Borsodi. In a prolific body of work in the 1920s and 1930s, he showed that the most efficient way to produce a great deal of our consumption needs was still in the informal or household economy. This included growing and canning vegetables, grinding flour, sewing clothes, and producing some furniture in home wood shops.

Borsodi’s argument was that the “superior efficiencies” of large-scale production in these areas were spurious. The unit cost of production at the actual point of production might be less than the cost of making things at home. But since home production was at the point of consumption and directly geared to need, production costs were final costs; factory production costs, on the other hand, were just initial costs. The costs of factory administration, inventory, long-distance shipping and high-pressure marketing more than offset whatever efficiencies existed in production costs as such. According to “Borsodi’s Law,” production reaches a scale at a fairly low level of output where the economies of large-scale production are more than offset by the diseconomies of large-scale distribution.

The inefficiencies and chronic crisis tendencies of mass-production industry would likely have destroyed corporate capitalism in the Great Depression, had the great powers not pressed the reset button and postponed the crisis of overaccumulation for a generation by destroying most plant and equipment in the world outside the U.S., and creating a permanent war economy to soak excess capital and utilize spare production capacity. So the period from roughly 1940 to 1970 was the Golden Age of mass-production industry.

This came to an end around 1970, as Europe and Japan finished rebuilding the industrial capacity that had been destroyed in the war. The crisis of excess capacity and overaccumulation, and the declining rate of profit, both of which had almost destroyed the system in the 1930s, returned with a vengeance. At the same time, with Vietnam the U.S. finally began to reach the limits of its ability to promote capital export through imperialism. And it required more and more socialization of corporate costs, and more and more subsidized inputs, to maintain even minimal profitability — leading to what James O'Connor called “the fiscal crisis of the state.”

So mass-production oligopoly capitalism was losing its artificial efficiencies and ceasing to be viable.

Nevertheless, at the time Ward wrote his commentary on Kropotkin, the latter's theses remained “as controversial and revolutionary today as they were when he formulated them.” To a large extent this was because the alleged superior efficiencies of industrial gigantism, capital-intensiveness and mass production were the dominant ideology of corporate capitalism. It was universally believed that this model of capitalism was the most efficient possible way of doing things, not because it was, but because the centralized machinery of corporation and state was run by people with a vested interest in the perception that no viable alternatives existed to a world run by people like themselves. To this very day paleo-Marxists, Galbraithian liberals and right-wing

Austrian economists alike agree on the essential link between capital accumulation, “roundaboutness” and productivity.

Ward himself saw all the economic tendencies of his day, as late as the early '70s, still leading away from the direction Kropotkin had pointed out. But Ward wrote at a time when the technological base of the successor economy was just starting to emerge, and the alternative choices had not yet sorted themselves out and become clear.

At roughly the same time a new generation of anarchist thinkers like Ward, Karl Hess and Murray Bookchin were discovering the potential of small-scale industry, new technological developments were once again tipping the balance in favor of small-scale production in the same way that electrical power itself had done a century before.

CNC (computer numeric controlled) machine tools had first been developed soon after WWII with Department of Defense R&D money and introduced in Air Force contractors as a way of deskilling labor within heavy industry. But by the 1970s the invention of cheap micro-processors and micro-controllers made it possible to integrate digital control into machinery scaled to – and affordable by – small shops. Such machinery became the basis of the industrial district economy in Emilia-Romagna, with production organized on a flexible craft basis much like Kropotkin had foreseen. It was also the basis for job-shop production in the Shanzhai enterprises of China, which sprang up in the '80s and '90s to engage in outsourced production on contract to Western transnational corporations.

The rise of cheap personal computers in the '80s and the Internet in the '90s made possible the horizontal coordination of production, as an alternative to both hierarchical administration and the anonymous cash nexus. A network of cooperative shops in a community could coordinate an industrial supply chain according to a common digital CAD/CAM file, with virtually no transaction costs.