

## ***THE FUTURE LOOSE AMONGST US***

By Michael Ventura

Feb. 22, 2013

“The first thing a [horse-and-buggy] cab driver would have said if left alone with the motor-car would have been: What’s so new about that? Whereupon he would have harnessed up four pairs of horses to it and driven off.”

That is Bertolt Brecht’s metaphor for the conventional response to what is genuinely new. When politicians and commentators speak of job loss and revitalizing the (so-called) middle class, they sound much like Brecht’s horse-and-buggy man.

“Candidates for U.S. president last year never tired of telling Americans how jobs were being shipped overseas. ... But most jobs cut in the U.S. and Europe weren’t moved. No one got them. They vanished. ... Software is picking out worrisome blots in medical scans, running trains without conductors, driving cars without drivers ... sifting through documents for evidence in court cases ... [and] sorting returned library books. ... The Hackett Group ... estimates 2 million [jobs] in finance, human resources, information technology, and procurement have disappeared in the U.S. and Europe since the Great Recession. It pins the blame for more than half of the losses on technology” (Associated Press, Jan. 23.)

Commentators like Thomas L. Friedman voice what many believe: “Robots *will* eliminate jobs, just as the PC did, but they will be lower-skilled ones” (*The New York Times*, Aug. 25, 2012).

Wrong. “An Associated Press analysis of employment data from 20 countries found that millions of midskill, midpay jobs already have disappeared [due to software] in the past five years, and they are the jobs that form the backbone of the middle class in developed countries” (Associated Press, Jan. 26).

Example: Health care is commonly thought to be a growing, secure industry with a wide variety of jobs. Well, not for long.

“[Eighty percent] of what physicians do (checkups, testing, diagnosis, prescription, behavior modification, etc.) can be done better by sensors, passive and active data collection, and analytics. ... Eventually, computers *will* replace 80% of what doctors do. ... Lifecom showed in clinical trials that medical assistants using a diagnostic knowledge engine were 91% accurate *without using labs, imaging, or exams*. Another clinical study ... demonstrated that 75% of cases can be safely triaged to be treated by RNs” (CNNMoney, Dec. 4, 2012, italics in original).

A peculiar phenomenon: These developments are widely reported, yet politicians from the White House on down display complete ignorance. So do the op-ed pages of outfits that should know better, like *The New York Times*, which published a piece tut-tutting the impact of robotics: “In hindsight, historical fears of technological change look foolish” (Feb. 3).

Really? “[I]n the 1920s ... American farmers ... accounted for a fifth of the U.S. workforce. ... [T]oday only 2 percent of Americans work on farms” (Associated Press, Jan. 25). The main culprit: tractors. Drive America’s two-lanes and check out the all-but-deserted farm towns that thrived circa 1920. The world benefited from technological farming, but an entire way of life was wiped out.

That’s beginning to happen again, but on a much larger scale.

In “The Revolution Will Be Printed” (“Letters at 3am,” Feb. 8), I documented the present state of digital fabrication. So far, the popular press covers it mainly as a threat to gun control. Look at a story headlined “Tools of Modern Gunmaking: Plastic and a 3-D Printer” (*The New York Times*, Jan. 30) or “Will computers kill gun control? 3-D printing technology could make efforts to control weapons impossible”(salon.com, Jan. 25).

Neil Gershenfeld, a leading digital fabrication scientist, writes: “[D]igital fabrication could be used to produce weapons. ... When I have briefed rooms of intelligence analysts or military leaders on digital fabrication, some of them have invariably concluded that the technology must be restricted” (*Foreign Affairs*, Nov-Dec 2012).

Yet, as I documented, digital fabrication manufacturing can make (almost) anything, anywhere, cheaply and with virtually no pollution while, at the same time, eliminating the need for high-polluting transport. Imagine what that means for health, not to mention climate change, the privations of poverty, and space exploration. (Settlements on the Moon and Mars could be largely self-supporting.) But we are Americans, and our knee-jerk response is: What about guns?

As Gershenfeld writes, “Even if 3-D printers could be controlled, hurting people is already a well-met market demand. Cheap weapons can be found anywhere in the world.”

But 3-D printing can’t be controlled, partly because of how the process is done. Gershenfeld: “[P]arts that cannot yet be made by the [3-D] machine builders themselves, such as computer chips and stepper motors, are [mass-produced] commodity items ... with no central point of control. The parts that are unique to 3-D printing, such as filament feeders and extrusion heads, are not difficult to make. Machines that make machines cannot be regulated in the same way that machines made by a few manufacturers can be.”

But restriction is impossible also because Gershenfeld and his colleagues have been politically clever. As he writes, “The innovative people that drive a knowledge economy have one trait in common: They are not good at following rules.” Before their research gained enough critical mass to be noticed, 3-D scientists spread it around the world. No one government can put this genie back in the bottle.

Gershenfeld tells of “fab-labs” in the United States, Ghana, South Africa, Norway, Kenya, Afghanistan, England, Spain, Belgium, and the Netherlands – at least 100 worldwide and many more in development. A design for wireless networks was “started” in Boston, “refined” in Norway, “tested” in South Africa, “deployed” in Afghanistan, “and is now running on a self-sustaining commercial basis in Kenya. None of these sites had the critical mass of knowledge to design and produce the networks on its own. But by sharing design files and producing components locally, they could all do so together.”

The implication is clear: Here is a manufacturing model that has nothing to do with borders or with capitalism’s concept of ownership and intellectual property rights.

Gershenfeld: “Anyone with access to the tools can replicate a design anywhere; it is not feasible to litigate against the whole world.”

While our government and commentariat think in modes that are quickly becoming antique, science and engineering are (yet again!) irrevocably changing the basics of society.

The institution of monarchy, already shaken by a rising merchant class, could not cope with complexities presented by the industrial advances of the 1800s. Monarchy is a form

of governance thousands of years old; in the West, it all but disappeared by 1930. Now, institutions that thrived during the industrial era – capitalism and nationalism – cannot cope with the robotized, digitalized possibilities that shake the present and promise to become the future.

We associate “work” with “employment”: We work for a company or a government. We don’t know what “work” will mean as software replaces most service tasks, and companies become obsolete because anyone can make anything anywhere. We don’t know what “governance” will be in a world where the means of manufacturing are decentralized and borderless.

As Gershenfeld says, digitalized fabrication “changes everything.”

That won’t be easy, but it may be thrilling.

To use a metaphor that may also become antique: open road ahead.

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