WHEN the first printed books with illustrations started to appear in the 1470s in the German city of Augsburg, wood engravers rose up in protest. Worried about their jobs, they literally stopped the presses. In fact, their skills turned out to be in higher demand than before: somebody had to illustrate the growing number of books.

Fears about the impact of technology on jobs have resurfaced periodically ever since. The latest bout of anxiety concerns the arrival of artificial intelligence (AI). Once again, however, technology is creating demand for work. To take one example, more and more people are supplying digital services online via what is sometimes dubbed the “human cloud”. Counter-intuitively, many are doing so in response to AI.
According to the World Bank, more than 5m people already offer to work remotely on online marketplaces such as Freelancer.com and UpWork. Jobs range from designing websites to writing legal briefs, and typically bring in at least a few dollars an hour. In 2016 such firms earned about $6bn in revenue, according to Staffing Industry Analysts, a market researcher. Those who prefer work in smaller bites can use “micro-work” sites such as Mechanical Turk, a service operated by Amazon. About 500,000 “Turkers” perform tasks such as transcribing bits of audio, often earning no more than a few cents for each “human-intelligence task”.

Many big tech companies employ, mostly through outsourcing firms, thousands of people who police the firms’ own services and control quality. Google is said to have an army of 10,000 “raters” who, among other things, look at YouTube videos or test new services. Microsoft operates something called a Universal Human Relevance System, which handles millions of micro-tasks each month, such as checking the results of its search algorithms.

These numbers are likely to rise. One reason is increasing demand for “content moderation”. A new law in Germany will require social media to remove any content that is illegal in the country, such as Holocaust denial, within 24 hours or face hefty fines. Facebook has announced that it will increase the number of its moderators globally, from 4,500 to 7,500.

AI will eliminate some forms of this digital labour—software, for instance, has got better at transcribing audio. Yet AI will also create demand for other types of digital work. The technology may use a lot of computing power and fancy mathematics, but it also relies on data distilled by humans. For autonomous cars to recognise road signs and pedestrians, algorithms must be trained by feeding them lots of video showing both. That footage needs to be manually “tagged”, meaning that road signs and pedestrians have to be marked as such. This labelling already keeps
thousands busy. Once an algorithm is put to work, humans must check whether it does a good job and give feedback to improve it.

A service offered by CrowdFlower, a micro-task startup, is an example of what is called “human in the loop”. Digital workers classify e-mail queries from consumers, for instance, by content, sentiment and other criteria. These data are fed through an algorithm, which can handle most of the queries. But questions with no simple answer are again routed through humans.

You might expect humans to be taken out of the loop as algorithms improve. But this is unlikely to happen soon, if ever, says Mary Gray, who works for Microsoft’s research arm. Algorithms may eventually become clever enough to handle some tasks on their own and to learn by themselves. But consumers and companies will also expect ever-smarter AI services: digital assistants such as Amazon’s Alexa and Microsoft’s Cortana will have to answer more complex questions. Humans will still be needed to train algorithms and handle exceptions.

Accordingly, Ms Gray and Siddharth Suri, her collaborator at Microsoft Research, see services such as UpWork and Mechanical Turk as early signs of things to come. They expect much human labour to be split up into distinct tasks which can be delivered online and combined with AI offerings. A travel agency, for instance, might use AI to deal with routine tasks (such as booking a flight), but direct the more complicated ones (a request to create a customised city tour, say) to humans.

Michael Bernstein and Melissa Valentine of Stanford University see things going even further. They anticipate the rise of temporary “firms” whose staff are hired online and configured with the help of AI. To test the idea, the researchers developed a program to assemble such virtual companies for specific projects—for instance, recruiting workers and assigning them tasks in order to design a smartphone app to report injuries from an ambulance racing to a hospital.

Working in such “flash organisations” could well be fun. But many fear that the human cloud will create a global digital proletariat. Sarah Roberts of the University of California, Los Angeles, found that content moderators often suffer from burnout after checking dodgy social-media content for extended periods. Mark Graham of the University of Oxford concludes that platforms for online work do
Indeed offer new sources of income for many, particularly in poor countries, but that these services also drive down wages. So governments need to be careful when designing big digital-labour programmes—as Kenya has done, hoping to train more than 1m people for online jobs.

Technology is rarely an unalloyed bane or blessing. The printing press created new work for the wood engravers in Augsburg, but they quickly discovered that it had become much more repetitive. Similar trade-offs are likely in future.

*This article appeared in the Business section of the print edition under the headline “The human cumulus”*
We Are What We Manufacture

By BETH MACY   MARCH 9, 2018

BEHEMOTH
A History of the Factory and the Making of the Modern World
By Joshua B. Freeman
Illustrated. 427 pp. W.W. Norton & Company. $27.95.

Joshua B. Freeman doesn’t chronicle the aftershocks of the loss of five million factory jobs from the American landscape or show you the impact of disappearing factory jobs on towns across America. And I wish he had addressed the abandoned plants, escalating drug crime and crowded food pantries.

But what this distinguished professor of history at CUNY’s Queens College does is lay out two centuries of factory production all over the world in ways that are accessible, cogent, occasionally riveting and thoroughly new. The history of large factories, as Freeman outlines it, is the history of the modern world and most everything we see, experience and touch.

At a time when the ghost of the American dream hovers over headlines ranging from free trade vs. protectionism to opioid addiction and other so-called diseases of despair, “Behemoth: A History of the Factory and the Making of the Modern World” should be required reading for all Americans, especially the 8 percent of the American labor force who still work in manufacturing (down from 24 percent in 1960).

If you are reading this review on an iPad or iPhone or another Silicon Valley-designed computer screen, then Freeman’s history will not only explain how and
where your device came to be produced but also how the story of modern production parallels the story of your relative level of affluence, from the balance in your retirement funds to the circumstances prompting your ancestors’ migration from an unproductive Irish potato field to a western Pennsylvania steel mill.

There are few items in our homes that didn’t originate as disparate components in faraway supply plants, touched by many hands in multiple countries. But whose hands actually make and order the assembling of the products, from the B-24 builders in Ypsilanti, Mich., whose goods flew into combat during World War II, to the corporate owners who erected three million square meters of yellow netting to prevent overworked Chinese Foxconn workers from jumping to their deaths in 2010?

Freeman tells us who both the makers and the corporate owners are, and, more impressively, he shows us how, over a relatively short period of time, their stories come to be entangled. He wants us to leave his book grappling with the question: How should human beings balance economic good with environmental harm, need with greed?

He is more concerned with the building up of factories than the tearing down, chronicling the pros and cons of factory work with a scholar’s even gaze. When a developing country embraces manufacturing to propel itself away from agrarian subsistence, the work is invariably rote and exploitive and often even life-threatening. But, over all, life expectancy climbs and poverty and disease plummet.

That was as true in the wake of the Industrial Revolution in Western Europe — before which only half of French children, plagued by hunger and disease, lived to see the age of 20 — as it is now in Ethiopia, where the producers of Ivanka Trump’s shoes recently relocated from Dongguan, China, chasing a more desperate workforce content to work for a pittance (roughly $30 a month) rather than paying the rising wages of their predecessors in China ($560).

Capitalism, naturally, takes advantage of such increasingly swift and secretive moves. It was the striving capitalists, after all, who pioneered the world’s initial giant factories — first among them a British wigmaker named Richard Arkwright who patented his spinning machine in 1768, then created an empire of steam-powered
cotton mills. Arkwright knew he had arrived when he was able to lend the Duchess of Devonshire 5,000 pounds to pay down her gambling debts, even if he and his fellow mill owners used laborers as young as 7 years old.

Freeman dips into a delicious expanse of source material from Charles Dickens to Karl Marx to Tim Cook, from Bloomberg Businessweek to The National Rip-Saw. In roughly chronological order, British silk mill owners give way to the Boston barons who developed the factory town of Lowell, Mass., in 1822, building dorm-style housing for the out-of-town farmers’ daughters they hired and innovating a standardized production process that bested the British and would “morally uplift” via such utopian amenities as company-sponsored libraries and potted plants.

The wealthy Boston merchant Frances Cabot Lowell not only figured out how to churn out white sheeting more efficiently — the fabric used to make slaves’ clothing — but he was also the brains behind the radical innovation of the stockholder corporation. Before Lowell, that model was rare, usually reserved for public works, not the accumulation of private wealth.

Freeman loops around the globe nimbly, drawing parallels between the farmers’ daughters who sent money home from Lowell and the Chinese migrants who do the same from Guangdong almost two centuries later. Though I wish he would have lingered longer on the workers’ lives, he has a sharp eye for the raw, gut-kicking detail. A riveter in the Urals freezes to death on a scaffolding. Middle managers in Michigan have to learn the words for “hurry up” in English, German, Polish and Italian to keep Henry Ford’s assembly line humming along.

As he does with Diego Rivera’s industry-worshiping murals in Detroit, Freeman’s mini-portrait of the photographer Margaret Bourke-White shows how the public came to view manufacturing through her factory-fanatic lens, from Ford’s River Rouge plant in Dearborn, Mich., to Stalin’s giant tractor factory in a former melon field. With Henry Ford’s top architect, Albert Kahn, as their consultant, the Soviets squeezed wealth out of the countryside on the road to creating a socialist society after an initial epic fail. “The Russians have no more idea how to use the conveyor than a group of schoolchildren,” Freeman quotes Bourke-White saying.
“One Russian is screwing in a tiny bolt and 20 other Russians are standing around him watching, talking it over, smoking cigarettes, arguing.”

But the Russians eventually figured out how to make manufacturing advance both their socialist culture and their economy, inspiring the East Europeans, all of whom later inspire Taiwanese and Hong Kong businessmen setting up Chinese government-backed shops in Shenzhen and Guangdong.

Freeman’s final chapter, “Foxconn City,” is the finest and most searing profile of wealth-makers in the bunch, revealing the sheer drudgery of overworked people who make sneakers and iPhones but can’t afford to buy them and the quiet deal-making machinations fueling Silicon Valley’s billionaire class.

Quoting the Apple executive Tim Cook, the mastermind behind offshoring production to Taiwanese-owned contractors in China before his ascent to chief executive, Freeman shows how just-in-time production flourishes on the backs of poorly paid workers who are shifted from one factory to another in an entirely different region practically at the stroke of his keyboard. When it comes to inventory, Cook said, “you kind of want to manage it like you’re in the dairy business. If it gets past its freshness date, you have a problem.”

When wages rise because of retention problems or labor unrest, the Chinese government is happy to help Apple and others by handing out tax breaks and transportation projects to spur new, lower-paying factories in China’s hinterlands. No such help is on tap for a worker, trained with a specialized skill, stuck in a country that no longer supports the industry she works in and living in places like Flint, Mich., which can’t even guarantee the water is safe.

For the displaced, Freeman writes, “the future has already come and gone, perhaps leaving them with sneakers and a smartphone, but with little hope” for forging a post-factory life that is both sustainable and ecologically sound.

Though he never states it outright, Freeman’s inclusion of poetry by a Foxconn worker who committed suicide in 2014 telegraphs where his allegiances lie:
They’ve trained me to become docile
Don’t know how to shout or rebel
How to complain or denounce
Only how to silently suffer exhaustion.

“Behemoth” is contextually thin in places, especially Freeman’s take on deindustrialization. He doesn’t mention that, as life expectancy in East Asia climbed, mortality rates rose in America, or that drug dealers, not farm girls seeking sewing jobs, now flock to Lowell — a distribution hub for heroin.

Freeman only cursorily explores the aftermath of globalization, automation and unfettered free trade, and he doesn’t ask what the government owes the people still living in America’s former mill and mining towns. More robust retraining and access to need-based college financial aid? Incentives to resettle elsewhere? A New Deal for the displaced and drug-addicted?

Perhaps it’s beyond the purview of a historian to wrestle with such questions. Perhaps it is enough that this thoroughly researched history makes us question our own accumulation of the stuff in front of us and our complicity in the truth we dare not see.

Beth Macy is the author of “Factory Man: How One Furniture Maker Battled Offshoring, Stayed Local — and Helped Save an American Town” and “Dopesick: Dealers, Doctors, and the Drug Company That Addicted America,” coming in August.

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