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We're already surrounded...

Robots, robots everywhere

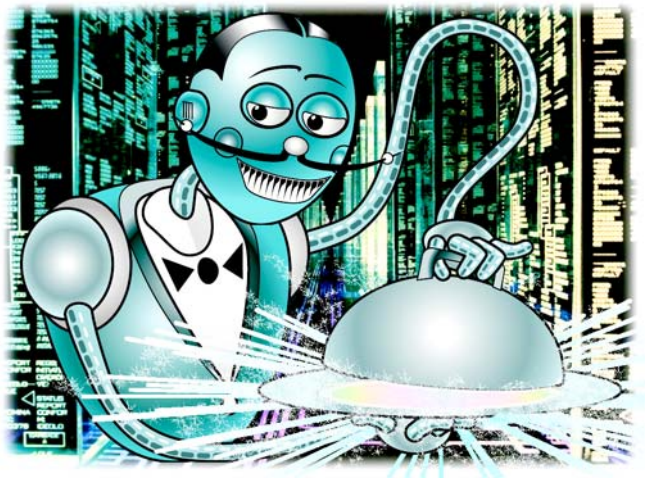
There's something disturbingly different about the Great Recession. The current economic recovery, such as it is, is not bringing back jobs. And that's just the start of what could be not very good news for the foreseeable future.

Most of these jobs haven't been lost to foreign workers but to others that also work long hours, get no benefits, and pay no taxes – **robots**. A recent analysis by the Associated Press concludes that the future that science fiction long foretold "when we would be architects of our own obsolescence, replaced by our machines... has arrived. "

The numbers are indeed grim. In the US, half of the 7.5 million people who lost their jobs made from $38-68,000, but only 2% of the 3.5 million jobs that have come back pay as well. The trends, even worse in Europe, are clear: most of the jobs lost are never coming back, and surprisingly, they're not just in manufacturing but also in the service sector, where two-thirds of all workers are now employed.

Economic downturns have always resulted in new, more efficient technologies being adopted. But always before they have led not just to more productively and efficiency, but entirely new businesses. Yet it seems only software developers are now thriving. Technology is eliminating far more jobs far faster than it can create them. Entire categories such as secretaries and travel agents are disappearing.

Experts say this is just the beginning. AP has found that the efficiencies mechanization has brought to manufacturing for the last three decades are now being increasingly unleashed on all kinds of office work and retail sales.



The most vulnerable citizens of this brave new world are anyone doing **repetitive tasks**. Accountants, office managers, even sports writers and paralegals are already being replaced, and as software becomes more sophisticated, those who supervise and juggle things will be also.

It's happening everywhere, too: big corporations, small businesses, schools, medical facilities, non-profits, the military. It seems that no one is safe. Jobs based on programmable tasks will last only as long as human workers remain cheaper than machine replacements.

There will be fewer of those every day. But it means that workers who can use machines to be more productive but can't be replaced by them, such as artists, may prosper. Ironically, the lowest-paying jobs will also linger. Hotel maids may keep their jobs long after managers lose theirs.

Economics of obsolence

Back in the 1930s, John Maynard Keynes pointed out a "new disease" he called "**technological unemployment**." This means not only the replacement of human labor but that technological progess would outrun how quickly new uses for old workers could be found. But he was generally optimistic, predicting that by 2030 there would be only a 15-hour work week. The problem of economic scarcity would be replaced by one of filling all that leisure time.

The revolution began quietly by putting machines in dangerous or mind-numbing situations and that is still going on. The Air Force may lose three times as many drones as planes carrying pilots, but the savings of cheaper aircraft and not risking human crews are irresistable.

Unmanned trains are already here, and Google and Toyota are working on cars that can drive themselves. Experts predict delivery drivers, cabbies, and truckers will be obsolete in a few decades. Even staid libraries turn to "bookbots" to shelve paper instead of librarians just as hospitals are looking to robots and not nurses to deliver medicines.

What makes this possible is not just making individual things smart but linking them. Google's self-driving cars depend not just on its sensors but on constant connections to Google's online maps. And the sensors feed their information back into the system making it ever smarter.

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The Internet, and especially **cloud computing**, have drastically sped up these developments. Computer analysis of huge volumes of data, much too complex for any human to comprehend, allow organizations to not only understand their customers but the operations of their own employees. This allows them to get more out of workers, whether it's planning more efficient school bus routes despite driver layoffs, or using time-saving software that allows cops to file crime reports directly from their cars.

That leader in innovation, Amazon, recently bought **Kiva Systems**, a company that makes automatic inventory movers for warehouses, allowing same or next day order fulfillment. Other tech leaders are even more automated. Google's new half a billion dollar data center employs less than 200 people, Facebook's only 55.

Indeed, the giants of high technology today are not like the economic powerhouses of old. Apple, Google, and Facebook combined have 64,000 fewer employees than General Motors – and GM has less than a quarter of those it had in the 1970s, while making more cars than ever.

Software is getting smarter all the time. New industries will not be labor-intensive but digital. It may not be possible for many workers to develop the skills necessary to stay ahead of this overwhelming tsunami of change.

Tools that think

Looking back over the history of humanity, the rise of the robots seems as inevitable as it is unstoppable. Perhaps, as in *2001: A Space Odysssey*, it was somehow inherent in the first ape's discovery of the power of tools.

Though there is no hard and fast definition of just what constitutes a robot, there is a general consensus. A robot replaces human labor, so many are based on human forms and functions, but it does not have to be humanoid.

In fact, just as not all machines are robots, not all robots are even mechanical. Much software, especially self-regulating stand-alone programs, can be considered robotic.

While most machines that mimic people in activity or shape are recognized as robots, what is more crucial is **agency**. A robot must have some ability to perceive data or objects in its environment, and process that in response to stimuli. A device as simple as an automatic door could be considered a robot, but a 787 jet, despite its onboard computers would not be, as long as it's flown by pilots.

Thus there is something resembling a human being in a robot, either physically or mentally. And that is what gives them both their great potential and fills us with unease.

Welcome to the machine

Mechanical servants have been imagined for thousands of years. Possibly the first were the bronze handmaidens that assisted the lame Vulcan, god of the forge, while the first actual designs were dreamed up by Leonardo da Vinci for a mechanical knight, and may have actually been built.

The word "**robot**", from a Czech term for a coerced worker implying drudgery, first appeared in a play by Karel Capek in 1920. *R.U.R*, for "Rossum's Universal Robots," the company that manufactures them, is a very strange play, notable not only for the term but the first prediction that the masses of slaves would one day inevitably rise against us.

In this drama, mankind first stops reproducing even before the revolt because people are no longer needed. Then governments turn the robots, here biological androids, into soldiers to put down human resistance. They rebel and kill all. Thus the earliest speculation about robots shows several ways they could lead to humanity's demise.

Perhaps the historical experience of **slavery** is what has so soured modern expectations. Even the Romans realized that slavery not only degrades the slave but the master as well. Robot slavery, however, does not have to be brutal. It may be possible to program the machines to prefer their servitude. The result might not be much better. Instead of being hunted, humanity could be loved to death.

Are the *Terminator* or *Wall-E* the only alternatives available? Of course not. The experts AP consulted did not even consider those, though they could not come to a consensus whether the robot revolution would lead to an age of bounty for all, for a tiny elite like in *Metropolis* that run everything, or massive, persistent unemployment. The latter possibility at the moment seems all too likely, because nobody has come up with a workable solution.

Industry leaders, however, remain optimistic, one manufacturer's group claiming factory automation will create millions of high-skilled, higher-paying positions in the near future. Perhaps, but a bold new vision is still needed for long term prosperity, a new economic model beyond old ideas of scarcity and even the value of labor. One that would be geared to free all humanity from tedium for genuine creativity and greater living. We're not there yet, and the road may be rough. But everyone at least agrees on one thing: There's no profit in making endless cheap goods if no one can buy them.

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