

OPINION PIECE

What else needs to change?

By Tim Harford, Financial Times Columnist

Last year's *Blade Runner* sequel persuaded me to watch the 1982 original again – set in 2019. For all the amazing qualities of the film, it fails to provide a convincing vision of today's technology. And it fails in a particular way: when our hero Deckard falls for "Rachael", he already knows that Rachael is a highly intelligent organic robot, so sophisticated that she can hardly be distinguished from a human. Yet Deckard likes her and asks her out on a date – using a graffiti-scrawled public payphone.

That payphone is jarring, but in fairness to *Blade Runner*, we often make exactly the same mistakes when imagining new technologies. We wrongly assume that a technology like "Rachael" could somehow appear, yet little else would change. And we're hypnotized by the most sophisticated stuff, missing humble ideas that quietly change everything.

For example: when I embarked on my latest project – a book and BBC series about "Fifty Things That Made the Modern Economy" – everyone told me that I simply must include Gutenberg's movable type printing press. It was revolutionary of course, but when I came face-to-face with a 1450s Gutenberg bible, with its twin black columns of dense Latin text, I realised that there was another story to tell: the story of humble paper.

Without paper, the economics of printing simply do not work. Paper is nothing special, except that it is far cheaper than animal-skin parchment. It's so cheap that we now use it to wipe our backsides.

Other revolutionary cheap-as-toilet-paper inventions include: barbed wire, the cheap fencing material which allowed the colonisation of the American west; the lossy-yet-convenient MP3 music format; and the shipping container, a simple steel box that supercharged global trade.

Of course, some innovations truly are revolutionary, producing effects that would have seemed like sorcery to previous generations. The cell phone is one; the computer is another. Further back in time, one would include electricity and the internal combustion engine. Such inventions fit our instincts about what "new technology" should look like: unlike paper and shipping containers, they are mysterious and complex, like the organic robot Rachael.

Yet even here we think too much about the amazing technology, and too little about the workaday social and organizational changes needed to unlock its potential. Electricity should, by rights, have blossomed in US manufacturing in the 1890s, but in fact it wasn't until the 1920s that electric motors really delivered on their promise, and productivity surged.

The reason for the thirty-year delay? As the economic historian Paul David famously described it, the new electric motors only worked well when everything else changed too. The older, steam-powered factories had delivered power through awe-inspiring drive-shafts, secondary shafts, belts, belt towers, and thousands of drip-oilers. The first attempts to modernize simply replaced the single huge engine with a huge electric motor, changing little.

Electricity triumphed only when factories themselves were reconfigured. The drive-shafts were replaced by wires, the huge steam engine by dozens of small motors. Factories spread out; there was natural light, and room to use ceiling-slung cranes. Workers had responsibility for their own machines; they needed better training and better pay. The electric motor was a wonderful invention, once we changed all the everyday details that surrounded it.

I am as clueless about the future of technology as anyone – but I've learned three lessons by looking at its history. One: don't be dazzled by the fancy stuff. Two: humble inventions can change the world if they're cheap enough. Three: always ask, "To use this invention well, what else needs to change?"