The future is getting weirder all the time.

What Happened to Progress?

It's now 2020 – so far into the once-imaginary future the number itself looks sci-fi. The world should be swarming now with wonders long fantasized. After all, in the decade just ended, people began to talk daily with robotic assistants, planets were spotted around distant stars, drones encroached on airspace, and rockets finally landed on their tailfins.

Other than such novelties, however, the future seems to be a bit different than expected. Where's our **flying cars**? Prototypes appear every year or so, yet their coming is somehow still "five years away", just as it was over fifty years ago. The real problem is likely **legal liability**. Flying cars may be impractical until they can fly safely *without* human pilots, which is much more difficult than just putting wings on a car.

Such unforeseen complications make it very hard to predict if and when something will happen. Humans are generally way too optimistic in the short run and too pessimistic in the long term. Most of us act as if everything should keep on just as it has been. Since World War II, that means riding an ever-faster roller-coaster of innovation and radical social change.

So 1968's ***2001: A Space Odyssey*** had giant wheel-type space stations with Howard Johnson hotels and commercial flights to the Moon on PanAm spaceliners just 23 years in the future. The only future tech the film nearly got right were video calls, iPads, and AI, and it was *way* too early on all of those, too.

Twenty years later, the classic ***Blade Runner*** movie went even further out. Set in *November 2019*, it featured flying cars cruising over rainy, dark, and dystopian Asian mega-Los Angeles, with off-world colonies and rebel genetically-designed slaves, too.

While it's a relief that the darker aspects of sci-fi have not yet manifested, with such extravagent predictions behind us, it's little wonder that the period we are leaving was a "decade of disillusionment".

Maybe it's mass media and widespread internet access that's shown the flaws in everything. Most of our major institutions have been tarnished across the board, from churches, central banks, and government itself to the corporate rulers of the web and technology in general. The inequality of wealth between top and bottom is staggering. AI may make everything easier or take away all our jobs. And it appears that climate change threatens everything.

Optimism's getting a little hard to find. Will we face a future of flying cars, techno-climate apocalypse, or some bizarre combination? How did we get here? What should we expect now? The problem is that history is very messy and rarely straightforward.

The twisted trails of technology

Inventions are basically conservative. Both gradual improvements and radical innovations usually replace previous methods in the same place. Today's interstate highways, for example, often follow railroad tracks that ran over wagon-train roads, which depended on Indian paths snaking along animal migration routes, determined by geography.

Such physical constraints of past technology shape the new. The size of the **Space Shuttle's boosters**, for instance, was limited by the width of the railroad tunnels they passed through to get to the launch pad. **Tracks** were based on the size of **Roman roads**, which were built for the width of carts drawn by two animals. Thus, the diameter of the mighty rocket had been long pre-determined by a horse's rear end.

The **internet** has an even stranger history. **Electronic computers** were first invented in World War II to crack enemy codes and plot artillery trajectories. In a way, for better or worse, modern computing began with communications hacking and video games.

With the Cold War, atomic weapons, and the Space Race, the need for such machines multiplied, and so it was planned to link distant computers to each other by phone lines to ease the computing burden.

Living and working conditions also can shape inventions. The military's scientific geniuses who invented the net lived in a very sheltered environment – a small, scattered community doubly isolated from the world. Ironically, the rigorous security measures surrounding them were apparently taken for granted when they decided how computers should connect.

Simple **login** names were adopted as a convenience; **hacking** was originally a meritorious display of skills. Only later were **passwords** invented once the need for some sort of access control became obvious.

Thus it has been with every security measure devised to this day. The naivete of the internet's idealistic inventors guaranteed the ongoing war between users and abusers. They never imagined that their work would become public nor how cleverly malicious people would misuse it for personal gain.

From singing telegrams and science fairs

It took some smart tricks to get computers to talk to each other by phone. An early interface was a **teletype** – a typewriter connected electronically to the machine so it could print out distant messages as well as input programs and send messages. Each character was transformed into a series of digits, like **Morse Code**, but **binary** in nature, ones and zeroes.

The most efficient way to send this information over telephone lines was as an audible signal. So **modems** were invented to let the machines sing their data to each other. The happy music of their greetings across the miles is now but a fond memory of elder users.

A **telephone line** is basically a dedicated closed circuit between two parties. Other voices can be added to the conversation but it could quickly become chaotic if there were different discussions being held.

The way around this was to divide the conversations up into small **packets**, individually addressed, and sent out across the phone network and reassembled at their ultimate destination. This packet-switching method was modeled on the most robust delivery system around; one that could survive disasters or maybe even an atomic war: the **Post Office**.

Like mail, the packets were all individually routed along the fastest connection available. Unlike a phone circuit, there is no end-to-end contact; instead the data packets are *copied* from one computer to another only to be written over by the next batch.

That, in essence, is why **online piracy** is such a huge technical and financial problem for corporations: the internet utterly relies on copying; *any* technology, such as **DRM**, that attempts to limit or prevent copying has to be tacked on, and is often easily broken.

A teletype or **monochrome monitor**, however, could only provide very simple displays. **Tim Berners-Lee**, a scientist working in another ivory-tower institution, **CERN**, home of Europe's biggest atom-smashers, wanted to devise a way for his colleagues to share their latest scientific results online. These came in "**poster sessions**" – basically, the same sort of displays that kids make for science fair results, which his invention duplicated online. The **World Wide Web** embedded images. Even better, it used **hyperlinks** to connect to sources of information. Like the US military before them, CERN, a public institution, did not patent it or charge royalties. One shudders to imagine what the online world would be like if the internet was invented by a profit-minded private corporation.

The net has been adapted to serve many functions that it was never designed for. It's not a secure medium for transmitting data; yet we all depend on it for purchasing items, managing healthcare and so on. Neither is it a broadcast medium, yet millions stream videoes. If it all seems jury-rigged, it's because it is.

The whole **Rube Goldberg system** is mind-boggling anyway. Each time you click on a link, the summoned page is broken into packets of numbers, placed in envelopes, copied by computers repeating **singing telegrams** to each other until all the packages reach your laptop to be rebuilt into a little poster display.

It's not only a wonder that the internet works as well as it does, but that it works *at all*. Yet if you were to explain how the net works in such simple terms to a denizen of 1950, you would be called a raving lunatic.

Trying to predict the future rationally is not that easy after all. History proceeds by long smooth stretches interrupted by spikes of unforeseen developments or odd adaptations that have cooked quietly in the background, totally unappreciated until much later.

Basement inventors and academic dreamers still exist. If history is any guide, it's from such least-watched corners that the true revolutions emerge.

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