**Will There Be Work in the New Workspace?**

**Kenneth Hodge¹**

**SYNOPSIS**

Work, paid employment, from an economic perspective:

 • Creative Destruction

 • Survey of current Advanced Technology events

 ▪︎ Hardware

 ▪︎ Softwork and Network

 ▪︎ Storage

 •Where are the Humans?

**OVERVIEW**

In economics a healthy economy continues to grow and adapt. Companies seek profit through minor tweaks to the profit leader's model, or by rewriting the rules.

Rewriting important markets within the economy is Creative Destruction:

 • Creative: Rewriting the rules takes creativity and innovation.

 • Destructive: The old is forced out by the new.

Today's technology is moving quickly. Multiple generational changes are happening within a generation.

(1) Hardware

 ▪︎ Quantum computing: With principles from quantum mechanics, such as probabilities, computing is faster and more creative.

 ▪︎ Classical computing: Not to be outdone, both hardware and programming are keeping up with quantum. Classical supercomputers will control other types of computer processing, including quantum.

 ▪︎ Analog computing and novel approaches.

(2) Software

There are innumerable software options available. Companies know what products works best for their business. Software advancement enhance both existing hardware and the new hardware.

 ▪︎ Artificial Intelligence (AI): Advances in AI are being used throughout the technological world. AI Operating Systems will control supercomputers, enterprise mainframes, and smart phones. AI's potential is immeasurable. This is what scares people.

 ▪︎ Neural Networks: Combined with AI, you have the makings of a superbrain. Or superbrains, available to any company with the resources and drive to use one.

(3) Storage

Hardware and software need massive amounts of data. New materials and methods will gather and control this data.

Storage capacity has been growing exponentially since the 1960s (see Moore's law). New materials and approaches are in the pipeline.

 ▪︎ One (of many) possible developments is DNA-storage. Using literal strands of DNA, a cube the size of a sugar cube can hold all of the data on earth.

 ▪︎ Blockchain may hold the future of indexing the data, securing property rights, and countering cybercrime.

**Where are the humans?**

According to Creative Destruction, growth is not only inevitable, it is a means of growing productivity. The outlook is good; the open question is, "what skills will be needed?"

**WILL THERE BE WORK IN THE NEW WORKSPACE?**

**The Economic Theory Behind Economic Progress**

*"The essence of development is a discontinuous disturbance of the circular flow*." – Joseph Schumpeter "The Theory of Economic Development"

The business cycle is a sign of a healthy economy. If government or a central bank avoids interfering with the process a healthy market recovers quickly.

Businesses gravitate towards profit. They add accessories, minor tweaks, and ¹different marketing approaches. When insufficient profit is available, the number of competitors causes a maladjustment in the market. An economic downturn clears maladjustments.

While incremental advances are the norm, the market seeks The Next Big Thing, the piece that will generate creative distruction.

When the personal computer came out, portable computers were introduced. At that time, the state of the art did not allow mobile computers. Ten years later, batteries, storage, and monitors gave laptops a foothold.

This advance marked the end of the cathode-ray tube, old TV technology. It was a change that affected televisions, desk-top computers, and laptops. Not long after that, smartphones were developed, using the technology developed for laptops.

The Invisible Hand says that businesses will find the profit in the economy.

**What Does the New Economy Look Like?**

*"It was not by gold or by silver, but by labour, that all the wealth of the world was originally purchased."* Adam Smith "The Wealth of Nations"

In short, the more money, the more competition. Competition is at the heart of an economy. Where there is competition, resources are stretched.

The biggest resource, the hardest to find, keep, and grow is human resource. Wherever there is competition, there is a demand for labor.

This is why the future of work is positive.

**Understanding the Market. A Survey**

**Hardware: Quantum Computing**

The quantum world is probabilistic. In classical computing, the world consists of 1s and 0s. In quantum computing, there is an infinite spread of numbers from 0 to 1.

Quantum computers rely on the understanding of quantum physics. States of particles in motion cannot be measured. The process of measuring those particles changes them.

The first element is superposition. If you capture a computer datapoint (for quantum computers, a qubit) at any point in time, it can be anywhere between 1 and 0. Measuring it freezes it at a specific point, reporting it as 1 or 0.

The second element is entanglement. For each qubit there is a mirror reflection. A change in one causes the twin to change in the opposite direction.

As the quantum computer grows in capacity, its power grows exponentially. The strength of the quantum computer lies in its ability to work with large datasets.

A quantum computer excels in cryptography, pharmaceuticals, and material science. Algorithms identify innumerable combinations and predict outcomes.

Another usage is optimization. Suppose a pizza delivery company puts in a dedicated delivery system. Current mapping programs already provide that service. As the client grows, the need becomes more demanding. Compare that to a scheduling procedure for metro buses. They are complex and currently rely largely on human experience and intuition. Here the strength of a quantum computer is obvious.

The need for quantum computer optimization is high.

**Hardware: Classical Computing**

Individual computers are everywhere. They are not going away. iPhones became watches which became helpful best friends.



Beyond having a best-friend wristwatch, classical computer mainframes are still being developed. State-of-the-art supercomputers are precursors to future computing:

 • Exascale processing (quintillion calculations per second)

 • Materials with better conductivity and heat dispersion.

These classical processors interact with and control quantum – and other non-traditional – processors at near instantaneous speed.

In general, the drive for better, faster classical computers, starting, post WWII, with vacuum tubes, continues unabated.

**AI and Neural Networks As the New Operating System**

The complexity of new computer systems is already leaving humans in the dust. As capabilities expand, the need to manage them quickly and efficiently grows.

Consider a probable setup: A computer with a classical core, controlling a quantum core, an analog core, a massive internal and external network, and human interface, all at exabyte speed.

That is what an Operating System does. AI is well-equipped to handle it.

**Software: Artificial Intelligence**

AI, the hot topic in computers, is raising the most concern about eliminating human jobs. The concern comes on the heels of publicly available Large Language Models (LLM).

Prior to the release and rush to market of several AIs, development had been in the background.

 • IBM's Big Blue, for example, used rule-based AI to play chess

 • Medical AIs are logic-based

 • Factories use various types of AI for multiple functions like separate robot controllers, inventory planning and control, and data analytics.

AI has been on the scene for decades. LLM AI brought a new dimension to personal computers and gadgets Talking to an AI app in daily life just makes it personal.

But, in terms of new technology, it may not be that big of a deal. It speaks to the science fiction that has been fodder for movies and TV for over half a century. It points to the advances that are being developed in the background.

LLM AI relies on massive amounts of data. This data is

written words, parsed, labeled and stored. It follows basic rules of probability to construct answers consistent with the query. We see this same characteristic in predictive, type-ahead spell-check programs.

So it's just a dumb computer game with high-level volcabulary and statistical skills?

Maybe.

Consider, though, childhood development. Children start by mimicking the sounds they hear. They then associate sounds with things and actions. This acquisition process continues through one's life.

In the process, the vast majority of human response is derivative. Building a extensive asset-tracking Excel program with future-modeling may be unique. But it is still derivative.

**Software: Neural Nerworks**

Neural Networks have been around since the 1940s. The trick is to emulate the human brain. In the 40s, computers did not have the power and memory to employ the concept. In the 1980s, technology allowed neural net development.

AI, of all types, are heavily dependent on

interconnectivity. Neural Nets gather inputs, measures and weights them, and passes the output to the AI.

AI and neural networks provide the power and decision making necessary for employing a unifed computer network either in small business or the entire world.

**Storage: DNA Storage**

There are many avenues of storage research being pursued. The reasearch involves new materials. DNA Storage is one such area of interest.

AI, especially LLM, requires massive amounts of data for maximum performance. This includes past, present, and future communication in multiple languages. Visual and audio resources are beyond the skillset of strictly LLM. These, too, are memory hogs.

Sugar-cube sized DNA Storage could be achieved within 10 years. It shares limits with other developing technologies: cost, error correction, and connectivity. How do you connect with strands of DNA? Or molecules with other materials?

Allocating storage to multiple servers is a function of neural networks. Blockchain can help insure data integrity and indexing.

**Storage: Blockchain**

Whatever storage technology is used, storage will be distributed across networks. Even with DNA Storage, multiple locations for storage will still be used. Networks may be shut down, disasters can break connectivity, network traffic might overwhelm segments of the system, and privacy issues may restrict some companies' usage.

Blockchain is a digital ledger of transactions that's shared across a network of computers. This makes it an ideal tool for indexing distributed storage.

With sufficiently advanced storage and networks, blockchain serves as a special type of secure database. Each record has:

 • The previous transaction ID (old hash)

 • The current transaction ID (new hash)

 • Timestamp

 • Details of the transaction

 • Backup Documents or location of the documents.

Today's technology is limited by storage capacity and overall computing power. While most documents cannot be saved within the blockchain, it is possible that, within the next decade, storage will expand sufficiently to allow larger records.

**The Human Aspect**

"*The ability of each of us to survive in this new world depends on our understanding how the world, especially the world of work, is being reimagined. Things that never used to be connected are increasingly being reimagined as connected.*" Richard Nelson Bolles, "What Color is Your Parachute? 2020"

The future is a projection. Do not trust guesswork that is overly specific.

Just as when horse and buggy was replaced with motor cars, cities built trolley cars for access to central cities. Affordable cars for every family may not have happened without the drive of Henry Ford.

Looking over the landscape, computers, or even one massive computer network, can emulate the human mind.

Adam Smith's Invisible Hand, however, suggests that the world is too vast for an economist, or a school of economics, to make all of the decisions needed to run an economy.

Given the failure of command economies to develop successful five-year plans, individuals, seeking their own self-interest, still seem more reasonable than a mastermind computer.



Command economies overestimate the predictive powers of technocrats. Tax laws that treat taxes as a simple math problem do not work.

Will a computer work any better? Computers don't get migraines. They don’t understand pain.

**A Computer In the Economy**

AI may be pretty good at modeling human behavior but it cannot master it:

A manufacturing plant, before readily available computers, may have had just-in-time practices. It needed an army of inventory clerks to make it work.

This sounds like a technocrat's dream. In a proper robotic dystopia, however, technocrats are functionaries, replaceable drones, useless beyond their facade of value.

The economics suggest that AI cannot deliver.

 • The dynamic of the Invisible Hand is not to keep stuff available, it is individuals surviving and thriving, making life better for themselves.

 • With Creative Destruction, productivity increase means more work and better work. It does not say what that work will be.



**What computers don't know**

There are things that are so supremely sentient that computers are never likely to know, understand, and properly respond to:

 • Politics, the art of lording one's power and prestige over others. Often associated with the right to mate, hierarchies are present throughout the animal kingdom.

 • War, too, is common in the animal kingdom. It can be a means of reallocating resources. It can be irrational hatred from times immemorial.

**What humans do know**

Changes are fast outpacing the training. To say "kids, today, don't know how to work" is misreading the room. With generational changes happening multiple times within a generation, of course there will be displacement.

In the 1980s computers – both mainframe enterprise systems and networked desktops – replaced desks of clerks and bookkeepers. Humans still verified transactions. These types of jobs will always be needed. The functions and activity may look different but they are conceptually the same: oversee the systems, verify proper function, and identify integrity and security.

Staying at the forefont of technological advance requires hard work, intuition, experimentation, and luck. Maybe computers will learn how to "try things out," maybe they

won't. Computers probably already do better programming. Do they, will they, have deeper insights?

**Work: a sociological question**

Beyond the scope of this paper: Will there be work in the new economy? Is the answer sociological, dependent on culture?

 • Work is goal-centric: Work until a desired goal is attained. Stop working.

 • Work is work-centric: One's self-image is intricately tied to one's success. "He who dies with the most toys wins."

Typically, the second is associated with Western European and America.

**AI Intelligence**

Every marketer is looking for the client's pain point. Computers don't have pain points. They don’t feel defeat when a project fails. They don't feel the dopamine rush of success with a win. Deep Blue felt no sense of victory when it beat Garry Kasparov in chess.

It is easy enough for a human to understand another human. Even if AI were to attain sentience and intelligence, it would have a computer understanding.

In looking for human things that computers can only emulate:

 • Thoughts, feelings, drives that humans have. Can a

computer understand anger? Can it understand restraining one's own emotions?

 • Self-reflection. A human can recognize bias and can evaluate them. Computers? They are totally dependent on input.

 • Morality and ethics. Each person is grounded in a sense of right and wrong. For humans it is grounded in one's earliest childhood and possibly DNA. Humans have difficulty "reprogamming" who they are. Computers? A change in management and a week of programming.

Will there be a significant source of mid-level jobs? This is anybody's guess.

 • AI is actively working on healthcare issues: medical consulting, scheduling vitals, dispensing drugs, pharmaceuticals. But healthcare needs human touch.

 • Computers can learn sales techniques but how well can they identify what moves an individual buyer?

 • Can a robot analyze and fix a problem as easily as a handyman?

An independent contractor has a huge advantage over a computer: He knows the right questions.

**CONCLUSION**

Economic Theory says that where there is a profit to be made, businesses will be there to "help" the market

leader share those profits. The most important resource is human innovation. That resource needs compensation. There will be work.

Current technology comes as revolutionary technology, such as quantum computing, and evolutionary advances, such as innovation in classical computing.

The technology state-of-the-art is computing power that exceeds the human mind. As impressive as the new technology is, it is not sufficient to replace humans:

 • Roles common to sentient life, like politics and war-making, can only be copied, not understood, by computers.

 • Roles requiring persuasion, especially when tied to matching people to innovative creations, are better suited to someone who understands individual people.

 • Some roles, like in healthcare, need a human touch.

**ABOUT**

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My interest in the topic of this paper is twofold:

(1) Keeping up with current technology

(2) Evaluating business in terms of value as expressed by classic economics.