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Humans Have New Roles in This Digitally Disrupted World

By Daniel Burrus, CEO of Burrus Research

While there is oftentimes a "generational war" between the young and the old in the workplace, where the divide is created by the younger generation's familiarity with technology and the older generation's aversion to it, the multigenerational concern that plagues all age groups is that technology will outpace humans, leaving many unemployed.

It is an understandable fear, especially if you consider my Hard Trend Methodology. Hard Trends are future certainties that will happen, and digital disruption, which includes and is certainly not limited to artificial intelligence (A.I.), are without question Hard Trends.

In the eighties, I identified the Three Digital Accelerators: processing power/computing power, bandwidth, and storage, which are three improvements to the digital spectrum that will increase the frequency and efficacy of digital disruptions.

> *Humans will always be needed, just in new ways!*

So if the Three Digital Accelerators validate the future certainty of Hard Trends even more, this is precisely why I say it is an understandable fear for many to have.

Artificially intelligent computers and their ability to perform tasks humans traditionally do will inevitably happen. However, there is great news: humans will always be needed, just in new ways! That's

right, human potential is also a Hard Trend in itself.

Before I get into that, let's delve a little deeper into Bloom's Taxonomy of the Cognitive Domain to better understand the computer's place in the human world.

The Cognitive Domain
Bloom's Taxonomy of the Cognitive Domain is a hierarchy of how the cognitive processes of a human being operate.

Think of this graphically as a pyramid. On the bottom, you have remembering, which involves recall and listing information. Next comes understanding, where comprehension and discussion take place. Third is the act of applying the knowledge from understanding, fourth is the ability to analyze patterns, fifth has us evaluating those patterns to draw conclusions, and at the very top of this pyramid is creating. Creating is the ability to use old concepts to create new ideas.

Looking at these concepts like a pyramid allows us to better understand the following: the higher you go on the pyramid, the more "human" these pieces to the cognitive domain become in our age of digital disruption.

To put that in simpler terms, the very bottom of the pyramid being

TECHNOLOGY NEWS HIGHLIGHTS

Virtual Reality Farming

As this year's Consumer Electronics Show (CES 2021) goes virtual due to COVID-19, manufacturers have come up with ways to make their message even more impactful using virtual reality (VR).

For example, John Deere is sending headsets to reporters to replace the in-person experience and give them a glimpse at what the innovative farming company is doing to further revolutionize farming.

This year, it's all about "precision farming" – the push to optimize the actual planting of the seeds to improve yield.

The VR experience follows the journey of a seed to illustrate how soil conditions, planting depth and seed spacing can translate into maximum productivity when spread over billions of seeds across an entire field.

The point is to generate awareness about the complexities of farming from a vantage point that you could never experience in the real world – the seed.

And best of all, visitors can do it from the comfort of their own home!

For information: John Deere, One John Deere Place, Moline, IL 61265; Web site: John Deere US | Products & Services Information

Understanding Proteins

The breakthrough could have profound implications in the medical arena to increase understanding of diseases and potential treatments, as well as environmental applications in the development of new enzymes for breaking down industrial waste and other pollutants.

For information: DeepMind; Web site: Homepage | DeepMind or AlphaFold: a solution to a 50-year-old grand challenge in biology | DeepMind

Alphabet (the parent company of Google) recently announced the development of an artificial intelligence (AI) algorithm that can predict the shape of a protein from its component amino acids. Called AlphaFold, the program uses deep learning to model a protein's structure in a matter of days with a high level of accuracy.

Proteins are made up of twenty different amino acids that can assemble in as many as 10300 different shapes. More than a simple chain of molecules, proteins form complex "folds" based on the interaction of these amino acids. Each shape determines the function of that protein in sustaining life; for example, enzymes to maintain body chemistry, myosin to keep muscles working and hemoglobin to carry oxygen in the blood.

While there are more than 200 million known proteins, the structure of only 170,000 have been identified. This has been done through experimental trial and error using expensive, specialized equipment and techniques like nuclear magnetic resonance, x-ray crystallography and cryo-electron microscopy, all of which can take years.

The AlphaFold algorithm was "trained" using what is already known about these 170,000 proteins to piece together protein structures based on a simple list of components.

World's Smallest Nuclear Power Plant

Idaho is slated to be the site of an innovative nuclear power plant that's hundreds of times smaller than traditional reactors and can be housed in an A-frame building. Known as Aurora, the new reactor differs from current designs in several ways.

For one, the fuel – high-assay, low-enriched uranium (HALEU) – is basically nuclear waste that has been enriched to have a higher concentration of U-235. This provides more power per unit volume and longer core life. It's been estimated that the reactor could run without refueling for twenty years.

Unlike gigawatt-scale reactors, the new system is sized to produce about 1.5 megawatts of power – enough to serve about 1,000 homes. And unlike traditional reactors, Aurora will not use water to slow

down the fission reaction, enabling the overall size to be greatly reduced.

Perhaps most important, these novel power plants could change public perception of nuclear power in general by producing energy more safely and economically than their gigantic counterparts.

For many experts, nuclear power continues to be a vital consideration for combatting climate change, and such an approach may be an important step in growing this segment of our power infrastructure.

For information: Oklo; Web site: Oklo Inc – what could you do with a MW-decade of emission-free power? or Commercializing next-generation nuclear energy technology | MIT News | Massachusetts Institute of Technology

temperatures just a few degrees above absolute zero, photons as qubits can operate at room temperature, giving them a huge advantage.

To be fair, Jiuzhang was created specifically to do the calculation that it was tested with – known as the "boson-sampling problem."

At this point, it can't be programmed for any other uses, so it has no real practical or commercial application. However, someday quantum computers could revolutionize industry worldwide, and this work represents a big step in that direction.

For information: University of Science and Technology, 1129 Huizhou Ave., Baohe District, Hefei, Anhui, China 230052; Web site: University of Science and Technology of China (ustc.edu.cn)

Quantum Supremacy

Gaming Display

China recently demonstrated a quantum computer that can complete a calculation – which allegedly would have taken a supercomputer an estimated 200 billion years to complete – in a matter of minutes. Called Jiuzhang, the quantum computer circuits were created using photons that carry data through optical paths manipulated by mirrors.

Unlike superconducting loops (ala Google's Sycamore processor), which require

Also expected to be unveiled at CES 2021 is a new bendable organic light-emitting diode (OLED) display that can transform from flat to curved at the touch of a button.

It also features an integrated 0.6mm "ultra-thin film exciter" that allows it to vibrate, producing its own sound without the need for speakers.

Called the Bendable Cinematic Sound OLED (CSO), the 48-inch display is optimized for

gaming by allowing the user to maximize the visual immersion experience.

It also boasts a 120Hz refresh rate and a 0.1ms response time. Pricing and availability have not yet been released.

For information: LG Electronics USA, Inc., 111 Sylvan Ave., Englewood Cliffs, NJ 07632; Web site: LG: Mobile Devices, Home Entertainment & Appliances | LG USA

Taking the Ocean's Temperature

About 90 percent of the heat trapped by greenhouse gases is absorbed by the oceans. Now scientists have found a creative (and maybe more effective) way to monitor changes in ocean temperature using a unique source of sound – earthquakes.

Current methods employ ship-based or flotilla-based temperature sensors that can drop down to depths of about 6,500 feet, but they are limited in number and only provide a snapshot in time. Satellite imaging covers a broader area, but it cannot penetrate deep beyond the surface.

In recent years, researchers determined that sound travels more quickly in warmer water than in cold and are now using that speed differential to reveal temperature changes over time.

Although they initially considered deploying acoustic emitters, the cost was prohibitive and there was also concern about the effect on marine life.

Instead, they decided to use the low-frequency waves that earthquakes create. Using acoustic data from more than 4,700 magnitude-3 or lower quakes, they compared sound wave speeds originating from the same location over a period from 2004 to 2016. The data indicated a definite warming trend of about 0.08 degree per decade, and while that doesn't sound like a lot, it takes a tremendous amount of heat to warm the eastern Indian Ocean. When used in conjunction with other methods, this technology could fill significant gaps in climate change data.

For information: Wenbo Wu, California Institute of Technology, Seismological Laboratory, 1200 E. California Blvd., So. Mudd Building, Pasadena, CA 91125; phone: 626-395-3779; email: wenbow@caltech.edu; *Web site:* Home | www.caltech.edu *or* Undersea Earthquakes Shake Up Climate Science | www.caltech.edu

Fighting Poverty with AI

An algorithm that uses artificial intelligence to identify people most in need of financial assistance was recently launched in Togo, where it has been estimated that 55 percent of the population lives in poverty. In rural areas, that number is more than 80 percent.

As COVID-19 shutdowns affect people throughout the world, charities like GiveDirectly are more focused than ever on getting cash directly into people's hands. The new algorithm helps identify those individuals more quickly and accurately, and it's totally contactless, an important aspect as the pandemic continues to spread.

Instead of relying solely on government data or poverty indexes, the GiveDirectly algorithm analyzes high-resolution satellite imagery to look at features that distinguish poorer areas from wealthier ones, like building size, building density, roofing materials and paved vs. unpaved roads. A second stage of analysis looks at mobile phone data for other clues such as data usage and length of calls. Selected individuals are prompted by text message to enroll and then receive payment via a cash transfer system that the Togo government set up several months ago. Cash can be withdrawn at local shops.

For a period of five months, recipients receive $15 per month for women and $13 per month for men, which is the amount that has been determined as necessary to minimally meet their survival needs. So far, the program has reached 30,000 people, with a goal of reaching 58,000, or the poorest 10 percent. To donate, visit The Audacious Project.

For information: GiveDirectly. Inc.; Web site: GiveDirectly: Send money to people living in poverty

World's Largest Casting Press

When Tesla installed the world's largest casting machine outside their factory in Fremont, California, it was so big that it had to be assembled outside...and then a building was constructed around it.

But true to their forecast, the first parts have already rolled off the line, and last month they started producing new Model Y SUVs with a single-casting rear underbody.

The massive casting replaces 70 different parts that were welded together in the previous Model 3.

Creating a single piece not only improves manufacturing but also reduces the number of potential failure points for greater long-term durability.

The company plans to install similar presses at their factories in Berlin, Shanghai and Texas.

For information: Tesla Headquarters, 3500 Deer Creek Road, Palo Alto, CA 94304; Web site: Electric Cars, Solar & Clean Energy | Tesla or Tesla Factory, 45500 Fremont Blvd., Fremont, CA 94538; Web site: Tesla Factory | Tesla

Humans Have New Roles in This Digitally Disrupted World

"remembering" is very easily accomplished by a computer.

Think of how simple it is to save passwords on websites you visit frequently or save your preferences in Apps you use.

The reason several fear technological disruption and do their best to rationalize it away or avoid it completely rather than becoming anticipatory and leveraging those changes to their advantage is because the bottom half of the pyramid are elements to the cognitive domain rooted in science and math; subjects and competencies that are at the forefront of career paths younger generations are guided toward.

The fact that a computer can accomplish the math and science element of our world better and better every year is troublesome for many; what happens when we do not need a science major, just as easily as we suddenly did not need to do longhand division with the emergence and acceptance of calculators and their subsequent integration onto your smartphone?

The Art Side Of Science
The answer to this lies in the top half of the pyramid, or what I refer to as the "soft skills." These include evaluating, analyzing, and most importantly, creating and creativity.

In case you are wondering, I'm talking about art. Yes, you read that right; the art

in science and math.

I guarantee you that many balk at that concept; how could art possibly be as important as science, math, and derivatives of those two subjects in school, such as computer science or programming?

If we are focusing on Bloom's Taxonomy of the Cognitive Domain coupled with my Anticipatory mindset, it is extremely important! As machines get better at the science and math of industries, what's left for the human being? The creative, critical thinking side, which is learned through tactile, digital, and industrial arts. To make this concept competitive for a moment, art is how the human race competes against and beats A.I., to be so bold.

Remember, many applications of math and science alone in many jobs are not necessarily impossible tasks, as one can imagine when focusing on the "understanding" part of the cognitive domain; translating data into something for us to understand.

That is quite literally what is happening as you read this article: data on the back end of the Internet is displaying this readable item on your screen by a computer. A human being isn't sitting behind a desk translating all that data by hand for everyone that reads this.

A.I. may be able to figure out the math and science of plumbing, but A.I. is not a plumber. The critical thinking to solve a plumbing problem comes from understanding science, but applying the art of plumbing as well, which highlights quality.

A more extreme example to consider is a heart surgeon. A machine may facilitate a less dangerous medical procedure as such;

however, do you want a heart surgeon that merely knows how the machine works, or one that knows every last little idiosyncratic thing that could happen to you on the operating table, and knows when to jump in and take meticulous care of you?

I personally prefer the hands-on doctor.

Teaching The Correct Competencies
Unfortunately, something I see far too frequently is that the education system is training young adults for future careers that, in accordance with my Anticipatory Organization Model, may not exist sooner than later.

Programming is a great example. We are training children to be programmers, but the reality is we will eventually have a computer that can program. We are not adequately preparing those children for what else they are capable of as cognitive, creative critical thinkers in the computer sciences. Many do not place a hint of emphasis on the art side of science, and this must change.

Let's place math under the microscope for a moment. It is, without a doubt, one of the most important competencies to learn for life, not just a career. To teach math, an anticipatory way to do so is to automate the part of education that is no longer fit for humans, such as teaching multiplication and division. Using gamification, where learning becomes interactive and hands-on rather than passive and disengaging, a student can practice multiplication and division, and the teacher becomes a coach of sorts, training them on how those competencies apply creatively, such as balancing a budget.

What we want is a society that thinks outside of the box to solve problems, save

lives, and improve humanity, and we do this by teaching augmented thinking and augmented physical behavior, which is augmenting your human abilities to work with the machines.

We are not taking a backseat to technology, we are finding a new place in society that the machines cannot replicate, as they are not sentient beings.

Plan The Future With An Anticipatory Mindset
The way we plan for the digitally disruptive future in the years to come goes far beyond just prioritizing the soft skills and art side of science; just as much depends on anticipation and the competencies behind my Anticipatory Leader System.

In said system, you learn how to identify what is a Hard Trend, or a future certainty that will happen as mentioned earlier in this article, and what is a Soft Trend, a future maybe that is open to influence.

Following something as profoundly disruptive as COVID-19, the fact that digital disruptions will increase even more is a definite Hard Trend that cannot be ignored.

You can identify specific disruptive technologies both inside and outside of your industry, or the industry you are looking to enter as a student, and then work to understand what soft skills apply to those disruptive technologies. Where do you fit in with your augmented thinking and augmented abilities?

Doing so not only keeps you above A.I. and autonomous technology but gives you a new purpose in an often noisy world.

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