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Daniel Burrus'

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TECHNOTRENDS® NEWSLETTER

*The biggest ideas that are
changing everything*

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Accelerated Hard Trends

By Daniel Burrus, CEO of Burrus Research

The predictability of disruption as an innovation accelerator is a central component of the Anticipatory Organization Model, focusing closely on how Anticipatory Organizations and individuals can look at disruption and see enormous opportunities.

The untimely situation we have been facing with COVID-19 is no exception. Not only has every industry been touched by the coronavirus pandemic and subsequent lockdowns; every country has. In many ways, there are actually three pandemics taking place all at once: a health pandemic due to the spread of COVID-19; an economic pandemic due to locking down cities, resulting in a dramatic reduction of hospitalizations and deaths but also massive business closings and unemployment; and a social pandemic driven by the horrific death of George Floyd and the resulting global protests.

Anticipatory Leaders have learned to turn disruption of any kind into an opportunity to shape a better future

However, much like they do with digital disruption, Anticipatory Leaders have learned to turn disruption of any kind into an opportunity to shape a better future by way of realigning their focus. Instead of developing strategies to get back to the way it was before the pandemic, they are using this time to transform their business models and cultures to dramatically improve upon what they have accomplished in the past and to become far more relevant both now and in the future.

Anticipatory Leaders know the future is not just about impressive new technology. It's about

people and relationships, and these leaders are changing their policies, adjusting their cultures, and finding new ways to address systemic injustices in an effort to level the playing field for all because they know that black lives do matter to everyone who wants a better tomorrow. The list of both large and small businesses that are making major changes to the way they do business is impressive and rapidly growing.

Anticipatory Leaders know that technology-driven Hard Trends that have been advancing over time have all been dramatically accelerated during the global pandemic, such as the use of videoconferencing.

A good example would be telemedicine; seeing a nurse or doctor using a videoconferencing tool such as Zoom has been growing for many years, but now it has become commonplace, and we will never go back to the way it was. In our post-pandemic world, you will see your doctor or nurse, but many of your appointments will be a video appointment first to see if you really need to come in. Let's face it: many problems can be solved with your doctor or nurse without him or her actually seeing you.

Another videoconferencing example would be remote working. This trend has also been growing over the last several decades, but now it has become commonplace, and we will never go back to the way it was. Post-pandemic, many of us will return to the office, but many will continue to work at home either all of the time or some of the time. The reality is that some people thrive

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TECHNOLOGY NEWS HIGHLIGHTS

Commercial Space Travel

The National Aeronautics and Space Administration (NASA) has partnered with Virgin Galactic to develop a supersonic vehicle for point-to-point civil and commercial air travel.

The new technology will leverage the company's experience in designing and testing of their existing spaceflight system – SpaceShipTwo – a winged passenger space vehicle that launches from a carrier aircraft dubbed WhiteKnightTwo. The system is designed to take-off and land using traditional runways.

Like its predecessor, the new spacecraft will travel at the outer boundary of Earth's atmosphere where friction and air resistance are low. This allows it to travel at more than

four times the speed of traditional aircraft and greatly reduces fuel consumption. It will also offer passengers some breathtaking views and even a few minutes of weightlessness.

In addition to giving private individuals a chance to experience the wonders of space travel, the new spaceships will open up more opportunities for space-based research.

Regularly scheduled flights will be operated out of the company's specially-built commercial spaceport in New Mexico.

For information: Virgin Galactic LLC, Mojave, CA; Web site: <https://www.virgingalactic.com/> or <https://www.virgingalactic.com/spaceport>



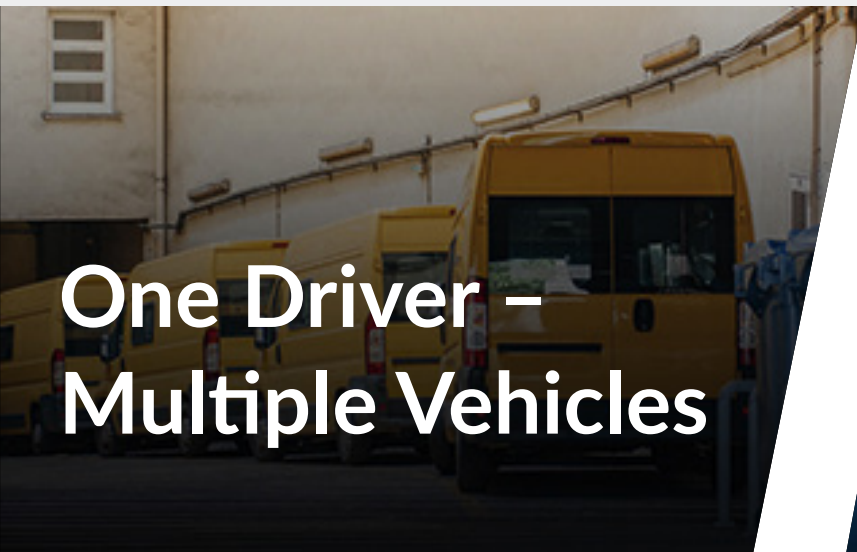
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BUSINESS LEADER IMPERATIVES

How Anticipatory Leaders are turning disruption and change into opportunity and advantage.

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One Driver – Multiple Vehicles

A newly developed semi-autonomous freight delivery platform allows a single driver to remotely operate multiple vehicles simultaneously. The new technology is designed to address a worldwide shortage of drivers while improving efficiency and drastically reducing emissions.

The autonomous electric transport (AET) vehicles – known as Pods – are managed over a secure channel to transmit real-time video and data to a network of monitoring stations in a variety of geographic locations. Operators will perform more complicated maneuvers such as parking, and will ultimately be able to control up to ten Pods at a time, depending on the driving conditions. The system can also switch between vehicles and operators as needed. In other words, rather than waiting for a Pod to load, unload, or recharge, operators could take control of another Pod that's ready to go, increasing productivity of drivers and vehicles.

It has been estimated that the current average capacity utilization of transport vehicles is only about 25 percent. However, Pods can be operated round the clock, and by expanding driver-to-vehicle ratio, fleet efficiency and utilization can be greatly improved. The company reportedly hired their first drivers in February.

For information: Einride AB, Luntmakargatan 18, 111 37 Stockholm, Sweden; email: info@einride.tech; Web site: <https://www.einride.tech/>



Making Science Affordable

An engineer and his group of students have developed a low-cost version of an electroporator – a tool that can be used to penetrate cell membranes. ElectroPen, as it's called, will enable more researchers to code living cells for any number of scientific applications such as studying drug reactions and modifying DNA.

Typical electroporators cost thousands of dollars, but ElectroPen can be made for just a few collars using a piezoelectric butane lighter.

The device delivers a five-millisecond, 2,000- volt burst of electricity to force open the cell membrane, allowing other compounds to be introduced. The students have already used it to modify the DNA of *E. coli* to produce fluorescent proteins.

ElectroPen has been published as an open source design in keeping with an emerging tradition of “frugal science.” The goal is to make synthetic biology and other scientific research more accessible, particularly in areas where resources are scarce.

For information: Saad Bhamla, Georgia Institute of Technology, School of Chemical and Biomolecular Engineering, 311 Ferst Drive NW, Atlanta, CA 30332; phone: 404-894-2856; email: saadb@chbe.gatech.edu; Web site: <https://www.bhamla.gatech.edu/> or <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000589>



Preserving Organs

A new machine has been developed that can keep a human liver viable outside the body for a week or more. The technology could mean the difference between life and death for thousands of people who die waiting for a donor liver.

Traditionally, harvested livers are preserved by flushing them with a cold solution and storing them on ice. This method can maintain viability for 12 to 18 hours. Recent improvements have extended that time up to 27 hours. But according to doctors, it takes about a week for a liver to begin regenerating when it has suffered damage. The new method would give them more time to assess the condition of the organ as it begins to repair itself.

The device mimics the human body by pumping blood through the liver to deliver oxygen and nutrients. A dialyzing component removes waste and toxins and a balloon resting under the liver acts like a diaphragm to alleviate pressure and prevent tissue damage. It's been tested on ten human livers that had been rejected for transplant because of damage. After

one week, six of the ten showed a decrease in damage associated molecular patterns (DAMPs).

The next step is to demonstrate long-term function in large animals. The method could one day also be adapted for hearts and/or kidneys.

For information: Pierre-Alain Clavien, University Hospital, Ramistrasse 100, 8091 Zurich, Switzerland; phone: +41-44-255-1111; Web site: <http://www.en.usz.ch/Pages/default.aspx> or <http://www.en.usz.ch/media/press-releases/Pages/perfusion.aspx>



Heavy Metal Detector

In recent years, testing water for heavy metal contaminants has become increasingly important as the use of pesticides and fertilizers, improper disposal of electronic waste and human activity contribute more and more to pollution of our water systems.

But collecting and monitoring is a resource-intensive task, and transporting samples is time-consuming and expensive. So engineers developed a way to simplify the process so that anyone can monitor their water quality.

Solid-phase extraction, preservation, storage, transportation and analysis of trace contaminants – or SEPSTAT for short – is

an inexpensive, whisk-looking device that absorbs trace contaminants of heavy metals, such as lead, copper, nickel and cadmium when swirled in a sample of water. Propeller-like panels made from a polymer mesh contain ion-exchange resin beads that bind with metals in the water.

The device is then left to dry before being shipped to a lab. At the laboratory, it's dipped into hydrochloric acid, which releases the metal ions for analysis by a mass spectrometer.

Tests have shown that SEPSTAT preserves about 94 percent of contaminants in each sample. The device costs about \$2.00 to produce and could greatly enhance water quality testing, particularly in remote areas.

For information: Emily Hanhauser, Massachusetts Institute of Technology, Department of Mechanical Engineering, 77 Massachusetts Avenue, Cambridge, MA 02139; email: ehanhaus@mit.edu; Web site: <http://web.mit.edu/> or <http://news.mit.edu/2020/instrument-may-enable-mail-testing-detect-heavy-metals-water-0225>

at ambient temperatures (68 degrees Fahrenheit or 20 degrees Celsius) for several months.

Inspired by the ability of amber to store insect DNA, the researchers developed a hard-candy-like substance from a mixture of sugar and salt to create a film.

The components are tailored to specific vaccines, but inter-mixing the ingredients is quick and can be performed with standard benchtop equipment. Up to 500 doses will fit on a standard-sized sheet. Best of all, instead of needles, the sweet-tasting film can be administered by mouth.

Tests on a typical flu virus compared favorably with vaccinations delivered by traditional flu shots. They also found that some virus strains were preserved for as long as 36 months. The next step will be to extend the temperature range to keep the films stable up to 130 degrees Fahrenheit (40 degrees Celsius).

For information: Maria Croyle, University of Texas at Austin, College of Pharmacy, 2409 University Avenue, A1915, Austin, TX 78712; phone: 512-471-1972; email: macroyle@austin.utexas.edu; Web site: <https://www.utexas.edu/> or <https://news.utexas.edu/2020/03/04/new-delivery-method-could-transform-vaccine-distribution-to-remote-developing-areas/>



Vaccine Film

A new way to store and ship vaccines could greatly improve access to life-saving vaccinations around the world. Unlike familiar glass vials, which must be carefully refrigerated, the new technology preserves live viruses, bacteria and antibodies



Slowing the Aging Process

A recently published study outlines a

possible step toward slowing (and perhaps reversing) the aging process. The technique involves rebuilding telomeres – tiny caps at the ends of chromosomes that protect our DNA from unraveling.

As we age, our cells continually divide, and with each division the telomeres get a little shorter until the genome degrades to the point where it can no longer divide successfully. Stem cells are instrumental in producing telomerase – an enzyme that rebuilds telomeres.

Researchers focused on a protein called PAPD5, which is known to reduce telomerase activity. They then proceeded to test more than 100,000 chemicals to identify two – BCH001 and RG7834 – that could act as PAPD5 inhibitors.

To test the compounds, human stem cells were modified to have telomere mutations and transplanted into mice. The PAPD5 inhibitors were then administered. Results showed that telomere length was restored with no adverse effects on the mice.

Earlier than normal reductions in telomerase activity can cause a wide range of debilitating diseases including dyskeratosis congenita, aplastic anemia, cirrhosis of the liver and pulmonary fibrosis. This research may provide a path toward treating these as well as age-related diseases.

For information: Suneet Agarwal, Boston Children's Hospital, Karp Research Building, Floor 7, Boston, MA 02115; phone: 617-919-7579; fax: 627-929-3359; email: suneet.agarwal@childrens.harvard.edu; Web site: <https://www.suneetagarwallab.com/> or <https://pubmed.ncbi.nlm.nih.gov/32320679/>



Robotic Gripper

A new gripper is designed to enable robotic handling of fragile and odd-shaped objects in light industrial and e-commerce applications.

Called Soft Gripper, the flexible silicon-molded unit comes in two configurations – star-shaped or four-fingered – which are easily interchangeable with the base unit. It requires no air or vacuum hookups and is also approved for food and beverage automation.

Soft Gripper is capable of handling objects up to 4.8 pounds (2.2 kilograms) depending on the surface friction of the items being handled. Available dimensions range from less than one-half inch (11 millimeters) to more than 4.5 inches (118 millimeters).

The mechanical and electrical interface is compatible with a variety of robotics manufacturers so that the end-of-arm tooling (EOAT) can be easily integrated with existing machines.

For information: OnRobot A/S, Teglvaerksvej 47H, 5220 Odense SO, Denmark; phone: +45-53-53-5737; email: sales@onrobot.com Web site: <https://onrobot.com/en>

Accelerated Hard Trends

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working alone, and some need the physical presence of a team to thrive.

How about all of the students and teachers who have been using videoconferencing to go to virtual school during the pandemic? Post-pandemic, students will go back to school, but now that students and educators know more about what the technology can do, we will see more of its use. For example, we now have a better understanding of how any teacher or school could bring nationally recognized experts or teachers of the year into classrooms to share their expertise. And as you might guess, we will see videoconferencing increasingly used for individualized instruction, reviews, tutoring and mentoring as the future unfolds.

Anticipatory Leaders are also anticipating problems and working to solve them before they happen as local, state, national and international businesses reopen. From an economic standpoint, businesses and universities—let's face it, everyone—must reopen soon, and it needs to be successful because there is little breathing room for error.

I have found that by asking good questions, you can begin to see opportunities to pre-solve problems before they happen. For example, will you feel safe eating in a restaurant, going to a mall, shopping in a retail store, riding on a train, flying in a plane, or taking a taxi, Uber, Lift or limo? How about attending a sporting event or live concert? Will parents feel their kids are safe, regardless of their age, when they go back to school? Will employees feel safe going back to work? Will they want to attend a physical meeting or an industry conference?

Unfortunately, the virus that triggered this global pandemic has not gone away and, to date, has no cure. And as I stated earlier, we have only begun to feel the economic tsunami from the

shutdown, which has not fully come into view. With this new heightened level of risk and uncertainty, it has never been more important to become anticipatory by solving predictable problems today.

So, what is the most important problem to pre-solve? Trust! As the world begins to reopen for business with COVID-19 still growing in many locations, the level of community, customer and employee trust will determine the outcome of your success.

If you are opening a shopping mall or a retail outlet, a restaurant, a gym, or even your office, it is imperative to ask yourself, what can I do to elevate trust so that people will want to come in and feel safe? Hint: Placing hand sanitizers in strategic locations and having people wiping everything down often is good, but that may not be good enough!

Once again, this is where technology Hard Trends that have been growing for many years and are now accelerating can come in handy.

For example, instead of taking the temperature of everyone entering your facility or a specific room by holding a handheld device to their forehead, which is intrusive and would slow the movement of people dramatically, you can use another Anticipatory principle, the Skip It Principle. You can skip the problem altogether by using small digital cameras that can detect the temperature of large groups of people all at once. They can be set up in key locations so that anyone with a fever will be shown in red, allowing you to stop them before they enter your facility or a room. It would also be good for them to know they have a fever so they can get checked out before something bad happens to them.

Another use of the Skip It Principle to elevate trust would be instead of trying to figure out what would make your employees and/or customers feel high trust, ask them! They will give you a great list. But remember, they will only tell you what they know is possible. Anticipatory

Leaders know they must take an additional step beyond asking because we are doing things today that were impossible just a few years ago, and most don't know all of the amazing new things that can now be done. So look at their list of ways you can elevate trust, and then look at the technology Hard Trends that are shaping the future for opportunities to take trust to the next level.

When you click on the link above and download my list of 20 Technology Hard Trends, keep in mind that they have all been accelerated during the pandemic.

Here is another quick example of an accelerating Hard Trend. An accounting firm recently told me that it has been trying to get its small- and midsize business clients to use cloud computing, but many have had a wait-and-see attitude. However, during the pandemic, with all of their employees and, even more importantly, their customers working remotely, they were now in a hurry to get into the cloud. All forms of cloud services are on an accelerated growth curve.

There are many emerging technologies that can help provide an elevated level of safety and trust. For example, mobile payment using your smartphone has been a growing Hard Trend for some time now and will accelerate greatly as we reopen. Why? Grocery stores and pharmacies who have been doing record business during the pandemic have learned that in order to keep employees feeling safe and coming to work, they must put in see-through partitions at checkout and as many touch-free systems as possible. Another related technology Hard Trend that is accelerating is cashierless checkout, something Amazon has already introduced, and now it is beginning to license the tech to other retailers.

A few more accelerating technology Hard Trends are contactless kiosks for self-service in retail stores, and hotel and airline check-in using facial recognition and/or voice and smartphone. How about touch-free doors that open automatically with motion sensors, and if the business is an

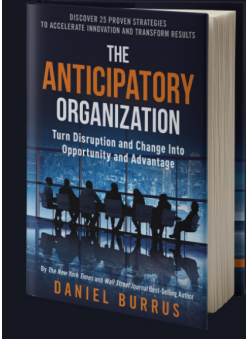
organization that needs security, biometric ID such as facial recognition?

Opportunities to innovate are everywhere. Need an elevator? Order an elevator with a smartphone, and have your touchless elevators controlled by your smartphone using a wireless Bluetooth link.

And let's not forget about keeping things clean and virus-free. Advanced air filtration systems, as well as smart airflow systems that can blow air in or suck air and viruses out, robotic floor and wall cleaners, and self-cleaning technology systems will all be in high demand.

One last comment on elevating trust for a successful reopening. When a number of major airlines recently made public announcements promising that everyone in line and on the plane would be wearing a mask and that there would be spaces on the plane between passengers, and that didn't happen, what happened to trust? I'm sure some of you have seen recent news stories in which passengers posted videos on social media of crowded planes and few passengers wearing masks. By the way, when you lose trust, is it easy to get it back? You know the answer is no! With that said, make sure you put elevated trust at the center of your reopening strategy.

It has never been more important to be an Anticipatory Leader who uses Hard Trends and certainty to turn change and disruption into opportunity and advantage.



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