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Daniel Burrus'

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# TECHNOTRENDS® NEWSLETTER

*The biggest ideas that are  
changing everything*

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# Transformation Requires Anticipation

*By Daniel Burrus, CEO of Burrus Research*

When it comes to the concept of digital transformation, we tend to focus on all the new digital tools, but instead we should be focused on transformation.

We likely understand the definition of digital; however, the key stumbling block is adequately defining transformation. What I've discovered, having worked with businesses and organizations of varying sizes worldwide, is that you can have a competitive advantage depending on how you define key words such as change and transformation.

We must better understand the term transformation because the vast majority of leaders say they are transforming a process, a product or a service when, in reality, they are really just changing it.

Predominantly, this is because most of us don't know the difference between transformation and change. And in today's world of accelerating exponential technological change, if you're only changing a product, service or process, you're falling further behind every year.

*Reacting quickly, no matter how agile you are, is no longer good enough.*

Change always comes from the outside in, forcing us to react and respond with as much agility as possible. It's important to understand that Agility is a defensive strategy, where an individual or organization reacts as fast as they can to a problem

or disruption after it happens, to something incoming, or something that is happening in the moment.

## Anticipation and Transformation Are Offensive Strategies

To deal with rapid change, being agile is important, but as the global pandemic of 2020 taught us, reacting quickly, no matter how agile you are, is no longer good enough. We now need to become much more Anticipatory, using Hard Trends based on future facts to anticipate disruptions before they disrupt and problems before you have them so they can be pre-solved.

Think of strategy to take advantage of accelerating change as a two-sided coin. Agility represents a defensive strategy, one side of the two-sided strategic coin when it comes to dealing with accelerating exponential change. Anticipation is the offensive side to said coin, allowing you to become what I refer to as a positive disruptor by using the certainty of Hard Trends to create the transformations that need to happen to elevate relevancy and accelerate innovation and sustainable growth.

Transformation is an anticipatory competency, one that is quite different from change. Whether it's a personal transformation or business transformation, it always comes from the inside out, and that gives you far more control in actively shaping your

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## TECHNOLOGY NEWS HIGHLIGHTS

# Next-Generation Electronics

For decades, researchers have been studying the quantum property of electron spin as a possible way to improve the storage, transfer and processing of information. Known as spintronics, the field is widely seen as a key step in the development of quantum computing.

Spintronics is based on the fact that, in addition to their fundamental negative electrical charge, electrons rotate on their own axis, giving them a magnetic moment (i.e., magnetic strength and orientation). In metals, this property has been studied for the possibility of storing large amounts of data. But a recent breakthrough in the use of spintronics in semiconductors is the possibility of converting spin-based quantum information into light – a field known as opto-spintronics – which would greatly enhance processing and transmission speeds.

One problem with past attempts at developing semiconductor spintronic devices has been the inability to orient and maintain the same spin state in all of the electrons at room temperature and above. They tend

to randomize at higher temperatures, so the best that was previously achieved was 60 percent. But a team of researchers recently reported success rates of up to 90 percent at temperatures as high as 110 degrees Celsius (230 degrees Fahrenheit).

They created a structure consisting of layers of different semiconductor materials, which serves to polarize the electrons so that they are all oriented with the same spin. As each electron encounters nanoscale regions of quantum dots (10,000 times smaller than a human hair), it emits a single photon of light, the angular momentum of which is dependent on the direction of spin. The advancement could someday become a common platform for uniting light-based and spin-based quantum technologies.

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# Bioreactor Salmon

In the new field of cellular agriculture, one company has developed lab-grown salmon that tastes and looks just like the ocean-caught variety. It even has a similar nutritional profile.

Unlike plant-based meat substitutes, the process starts with actual fish cells, which are placed in stainless steel tanks and “fed” with the same proteins, fats, carbohydrates and minerals that salmon would consume in the wild. Although the cells’ DNA is programmed to mature like naturally grown fish, a plant-based scaffold provides a structure to help them organize in a way that more closely resembles a fish.

With many types of salmon now becoming endangered or at risk, alternative production methods are needed to meet the demands of a growing population in a sustainable way. Wild-catch fishing is destroying biodiversity, and fish farming poses problems with water pollution. But seafood is still the most widely consumed protein on the planet and the current pilot plant is only the beginning of what will need to eventually operate at a much larger scale.

*For information: Wildtype, San Francisco, CA; Web site: <https://www.wildtypefoods.com/>*



# AI Control Tower

As robots, self-driving vehicles and autonomous drones are becoming more widely used, ensuring that they function safely and cooperatively in a broad range of environments is more important than ever.

For example, a new AI control platform called MAESTRO is designed for use in industrial settings to monitor the movements of androids and other unmanned devices throughout a factory or warehouse.

Computer vision continuously scans the area for potential obstacles, while artificial intelligence (AI) is used to map out a path to avoid collisions. By monitoring the movements of each device, the system also reduces the need for dedicated hardware (and humans) to operate them separately.

With an increasing demand for contactless services and a growing deployment of autonomous mobile robots and vehicles, smart tools such as this can help to boost safety and productivity affordably.

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# World's Whitest Paint

Researchers recently reported developing the whitest paint on record, capable of reflecting more than 98 percent of sunlight. As a result, it keeps surfaces up to 19 degrees Fahrenheit (approximately -7.22 degrees Celsius at typical outdoor temperatures) cooler than ambient temperature. In comparison, commercially available white paint reflects only 80 to 90 percent of the sun's rays. Even heat-reflecting paints, which are made with titanium dioxide, only reflect wavelengths in the visible and infrared spectrum, but still absorb ultraviolet waves that cause the surface to increase in temperature.

After evaluating more than 100 different materials, the researchers found that barium sulfate – a compound currently used in cosmetics, photo papers and other products – offered the best performance. In addition, they discovered that boosting the concentration of barium sulfate by a factor of six and varying the size of the particles further improved reflectivity.

Testing resulted showed the ultra-white paint provided an average cooling power of 113 watts per square meter. Painted on the roof of a 1,000-square-foot building, that translates to 10 kilowatts. And unlike air conditioning that simply removes heat from indoors and moves it outdoors, the new paint transfers heat through the atmosphere into deep space to reduce global temperatures. Statistical

modeling indicated that it could reduce the need for air conditioning by up to 70 percent in hot locales like Las Vegas or Phoenix. The new paint could be available to consumers in the next year or two at a cost that would be comparable to current products.

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# Microwave Boilers

As the world continues to transition away from fossil fuels for power generation and transportation, attention is now shifting toward making more sustainable heating systems as well. In colder climates, more gas is consumed for heating than for either electricity or vehicles, leaving the market for “green heating” wide open to technologies from electric immersion heaters to heat pumps to hydrogen-powered systems. In Britain, where the majority of residential heating systems are hydronic, gas boilers will be banned for new residential construction by 2025. Similar restrictions for new installations in existing homes will follow by the mid-2030s.

One alternative for hydronic heating systems is microwaves. When electrically dipolar molecules (like water) are exposed to a strong electromagnetic field, they will shift to align themselves with it. If that



field oscillates (like microwaves do) the molecules will move too, and this creates heat.

But using a typical microwave magnetron in a boiler system is not practical. So one company has developed a solid state version that fits on a chip. When arranged in an array inside a boiler, they can be used to deliver hot water quickly, whenever it is needed. The pipes can also be made using microwave-sensitive materials to further improve efficiency. One of the biggest benefits is the ability to interface with existing controllers and piping. The company plans to begin testing in homes in 2022 and have product available for sale by 2024 in advance of the new legislation.

*For information: Heat Wayv; Web site: <https://www.heatwayv.com/#home>*

with variations in blood composition. A machine learning algorithm is then used to distinguish human blood from that of ten animal species, including dogs, cats, ferrets, deer and elk.

Spectroscopy-based devices are well-suited for portable applications; however, further testing is required to calibrate the system with increasingly diverse species and widely variable diets. The researchers are collaborating with the New York State Police Crime Laboratory System to test the method in real crime scene settings.

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## Bringing the Lab to the Crime Scene

A new handheld spectrometer could soon offer police a way to distinguish human blood from animal blood on the spot at a crime scene. The tool would save valuable time and money in determining which samples are relevant to the case without destroying them in the process.

Current analysis methods use biochemical reagents and require a desktop lab instrument, making it impossible to conduct tests in the field. The new technique shines infrared light on the sample and records subtle changes in the spectrum that occur



## No More Dead Batteries

A new battery has been designed that not only stores power but also produces it. In the not-so-distant future, they could be mass-produced as dime-sized chips to power a broad range of electronics including fitness sensors, medical implants and Bluetooth devices.

The tiny powerhouse (dubbed the Vibration Energy Harvester) is made mostly of graphene – two-dimensional carbon sheets only one

atom thick. The sheets are capable of capturing minuscule amounts of kinetic energy from the motion of gas particles around them. In addition, their own thermal energy causes them to vibrate. All of this movement can be converted into electricity when the sheet is attached to the proper electrical components, creating a battery that never runs out of power.

When millions of them are put on a chip, the Vibration Energy Harvesters are capable of producing enough energy to power something like a temperature or heart rate sensor. It can also be scaled up for much larger applications; however, the focus of the technology is to bring power wherever it's needed rather than scaling up for larger generator facilities. The project is part of a multidisciplinary collaboration between industry and academia.

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Now, artificial intelligence (AI) is making it simpler and faster by generating millions of possible chemical configurations in days rather than decades.

Recently, an AI system was used to create two new antibiotics. First, a generative model was used to capture information about the vast number of available peptides – short amino acid chains that form the building blocks of proteins. Next, a system known as Controlled Latent attribute Space Sampling (CLaSS) analyzed the data to generate new potential peptides. Finally, deep learning classifiers were employed to discard ineffective and/or toxic combinations. In the end, the system came up with 20 candidates in only 48 days. The short list was ultimately narrowed down to two, both of which proved to be effective against a range of Gram-positive and Gram-negative pathogens, as well as safe in animal trials.

Antibiotic-resistant bacteria infect nearly three million people each year in the U.S. alone.

This is only one example of how AI can be used to accelerate discovery of new, lifesaving therapeutics.

*For information: IBM Research, 1 New Orchard Road, Armonk, NY 10504; phone: 914-499-1900; Web site: <https://research.ibm.com/blog/ai-finds-new-peptides>*

# AI Drug Development

In the age of “superbugs,” developing new medications that target antibiotic-resistant bacteria is more imperative than ever. But the process has traditionally been long and arduous.



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# Transformation Requires Anticipation

*continued from page 1*

future. For example, when Research In Motion (RIM) introduced the BlackBerry, it changed how we use email; they put it in a mobile phone so that we could check our emails while on the go. Apple, on the other hand, transformed the mobile phone; it gave us the ability to take photos, record video, watch movies and do so many other things beyond merely using it to send and receive emails and text messages.

When you create a change, you might make something bigger, smaller, taller, thinner or wider, or you might hire more staff, but that change is not transformation. When you create something new that has not been experienced before, you are moving to transformation. Barnes and Noble changed bookstores by making them large and elevating the experience with pianos, cappuccino and reading rooms. Amazon transformed buying books.

So outside of the COVID-19 pandemic and how the world responded to that, we are facing a multitude of other global issues that can better be solved using the principles of an anticipatory mindset.

## Transformation Is Needed to Address Global Problems

As I discussed earlier, we will not solve the most pressing problems by simply changing a process, product or service; we will need to transform it. The technology to transform every process, product and service is already here; it represents Hard Trends based on future facts that will happen.

Will your organization transform your processes, products and services or only change them? The answer is not based on a future fact; it's what I call

a Soft Trend, something that might happen – that is up to you!

One of the principles in my [Anticipatory Organization Model®](#) that I've taught for years is what I refer to as the Law of Opposites. I go into much more detail about the dimensions of it, and how to use this amazing law to accelerate exponential innovation and profitable growth in my [Anticipatory Leader® Learning System](#), books and blogs, but for now I'll show you how it can be used to solve problems that seem overwhelming and often unsolvable.

## Melting Ice Caps

Let's take, for example, a really big global problem, the melting polar ice caps, which is a measuring stick we use in watching the effects of global warming, and apply the Law of Opposites to find solutions.

Yes, I know, this has become a political subject, so I understand that many of you reading this think climate change is not happening. Let me take a few paragraphs to share my personal experience with this, since as I've traveled the world speaking, consulting and vacationing, I'm a two-million-mile frequent flyer on three different airlines, and that doesn't count the other dozen airlines I have flown on. I have a feeling I've seen more of the world over the past 40 years than most. With that said, over the past 40 years of flying over Greenland, I used to see nothing but white glacial snow when I looked down, and now flying over the same route, I mainly see exposed rock.

In 2017, I vacationed in Glacier National Park for the first time since I was last there in 1977, and there was a dramatic decrease in glaciers – not just snow, but glaciers. And lastly, as an advisor to the Department of Defense I can tell you that the military is building accelerated global warming into their plans, and even global oil companies



are building how to profit from accelerated global warming into their future plans – all meant as food for thought.

So, how can the Law of Opposites help? Instead of looking at the Big problem, look in the opposite direction, maybe a very small element to find a way to take action, in this case, the color of the snow! As you get closer to the pole, northern latitude snow has a lot of black soot on it. It's not beautiful white, there is a lot of dirty-looking glacial snow. As you might remember, black absorbs heat, and that accelerated the melting of the top layer.

Using the Law of Opposites again, instead of looking at the black soot on the snow, let's look in the opposite direction, at where the soot came from. So how do we figure out where that pollution is coming from and how to eliminate it?

It is possible to use existing equipment to test the soot and use that data to determine its exact source, usually a coal-fired power plant that uses low-grade dirty coal and has few if any pollution controls. If we track it back to its source, it's possible to find ways to prevent this problem from getting worse by, for example, creating a global funding source to clean up the problem plant. Will this completely slow global warming? Not necessarily, but it is an example of how little things can make big differences, and when you do a larger number of little doable things, positive change occurs.

### Wildfires and Mudslides

Another one of the principles in my [Anticipatory Organization Model](#)<sup>®</sup> that I've taught for years is what I refer to as the Skip It Principle. Skipping your biggest problems sounds too good to be true, but believe me when I say it is not! I've used it to start six highly successful companies, and so have hundreds of companies that have implemented this

strategy they learned from my books and learning systems.

One of the key elements of problem skipping is that whatever problem you're focused on is most likely not the real problem; that's why you are having problems solving it. There is another problem that is the real problem, and when you identify it correctly, it is solvable. As you might guess, there is a methodology for finding the real problem that I teach in my books, articles and learning systems, but instead of going through that now, I'll give you some examples to give you a better idea of how it works.

We have a lot of wildfires in California, and they have been getting much more destructive. Aside from the fires themselves, which the bulk of individuals safely escape, an actual growing problem connected to the wildfires occurs when heavy rains move in over these burned hills. When this happens, mudslides transpire and move fast, causing massive damage, killing wildlife and sometimes killing people.

Thinking as an anticipatory entrepreneur who is aware of the level of connectivity we have with our smartphones, we could put some sonic acoustic sensors placed around areas that have had fires, "listening" for a certain frequency of noise mudslides make. Adding Bluetooth networking capabilities and inexpensive 3G wireless chips to those sensors would allow the system to automatically notify all the people in the area via a mobile app that massive quantities of soil are starting to move, facilitating an immediate warning and perhaps even an exact picture of the projected mudslide area via this same app so individuals can quickly avoid the area.

Are there tools that we could put into place or laws that we could pass that would provide incentives

for people to help transform the world for the better? In California, there are incentives that allow homeowners to get solar panels put on their house, and recently an energy storage system, installed for free. In other words, technology is not the only place to look for positive solutions to our problems; government can play a role as well.

The biggest problem is that most of us are too busy managing today's crisis to be focused on identifying the exponential opportunities that Hard Trends provide, giving us a solid way to actively shape a better future for all. If we don't become anticipatory and look for ways to transform our processes, products and services instead of merely changing them in agile fashion, we will have more and more problems piling up to solve.

### Aligning the Futureview at Your Organization

I dedicate myself every day towards getting as many people as possible on the planet to be anticipatory and to start embracing some of these principles to better the world we live in, using disruptive technological advancements to transform the world in a positive way.

The reason I have an **Anticipatory Organization Learning System** and a book called **The Anticipatory Organization** is that I don't want just one person being anticipatory, and everyone to remain reactionary. I want to empower everyone I can to turn disruption and change into opportunity and advantage, especially when it pertains to the welfare of society.

Finally, I encourage people to be both agile and anticipatory. As I said earlier, agile and anticipatory are like two sides of a coin. The agility side represents playing defense, a fast, reactive strategy that's good for changes that seem to come out of nowhere, and many will.

The other half of the strategy coin is being anticipatory, playing offense, anticipating disruptions before they disrupt and problems before you have them so they can be pre-solved. Both are needed to turn the accelerating pace of technology-driven change into an advantage.



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