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# TECHNOTRENDS® NEWSLETTER

The biggest ideas that are changing everything

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## Change vs. Transformation—Know the Difference

By Daniel Burrus, CEO of Burrus Research

Think back to your earliest memories of watching television. If you're of a certain age, you may have had only a handful of channels from which to choose—not to mention wrestling with rabbit ears or risking your neck to climb on the roof to attach an antenna—and let's not forget getting out of your chair every time you wanted to change the channel. We did have a sense of choice, but we all seemed to watch the same shows anyway.

Then came cable and satellite television. Not only were your viewing choices vastly expanded with hundreds of shows to watch, but reception headaches were a thing of the past.

Fast forward to present day. Cable and satellite subscriptions are plummeting. Instead, more and more consumers are opting for streaming services and other options with a greater range of choice and cost flexibility. Moreover, they're accessing them on devices other than the living room TV. Laptops, tablets and mobile devices of all types are part of the mix, particularly among millennials, many of whom have yanked the plug on cable or satellite or, for that matter, never signed up for them in the first place.

Gone are the days when broadcast companies, cable providers and others dictate what we watched and when.

Viewing habits and patterns have also been turned upside down. Consider: Even as recently as 10 years ago, had anyone ever heard the term "binge watching"? The situation boils down to a game-changing shift. Gone are the days when broadcast companies, cable providers and others dictated what we watched and when. The audience is largely in the driver's seat now.

This scenario illustrates the stark difference between change and transformation. Adding new channels or making antennas unnecessary are forms of change, a series of relatively modest, incremental steps. On the other hand, being able to stream a movie, watch a live event or watch a how-to video on your smartphone while riding on the subway or flying in a plane is transformational.

That's a vital difference to understand. As I travel the world working with organizations in just about every industry, I find it amazing how many say they are transforming some process, service or product when, in reality, they are only changing it. That's because they don't really know the difference. In an era that's dominated by technology-driven, exponential game-changing shifts of all sorts, knowing the distinction between change and transformation can be essential to your organization's success and possibly its survival. Today, if you are only changing something, you are falling behind. Just as important, it's critical to recognize change and, from there, what additional steps may be necessary to shove change forward into outright transformation.

#### **Change Defined**

Change is a common term. But, in the context of an anticipatory mindset—one whose focus is on the future and identifying the opportunities inherent

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**TECHNOLOGY NEWS HIGHLIGHTS** 

## **Automating Scientific Discovery**

Many believe that the biggest crisis facing science today is "too much information."

Last year, in the biomedical field alone, more than a million papers were published, and to date, the total number of peer-reviewed biomedical studies is more than 26 million. At the same time, the quality of studies has declined.

Publishers' restrictions and author bias can make it difficult to extract reliable data, making it virtually impossible for scientists to keep abreast of all the latest developments, much less separate out the most relevant ones.

To combat this information overload, a new system has been developed that uses artificial intelligence to comb through the 4,000 scientific papers published every day and deliver insights regarding which ones have the greatest potential impact on future development.

A combination of neural networks, algorithms and machine-learning-based predictive intelligence goes beyond data mining to analyze the information and generate new hypotheses based on sound research.

Most importantly, as part of the Chan Zuckerberg Initiative, the system will be available to researchers at no cost.

For information: Meta Inc., 406 Richmond Street West, Suite 701, Toronto, Ontario, Canada M5V 1Y1; website: https://meta.com/

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Organs-on-a-chip are designed to model the activities, mechanics and physiologic responses of various human processes. Previous work in this field has successfully created microchips that mimic the architecture and functions of the lungs, intestines, skin, kidneys and bone marrow, providing a platform for accelerating drug development as well as advancing personalized medicine. Recently, researchers announced the development of a chip that models the mechanisms of the female menstrual cycle, including the complex and delicate hormonal signaling that can't be duplicated in a petri dish.

The three-dimensional chip consists of a network of tiny, interconnected cubes grown from human and mouse reproductive cells, including the endometrium, fallopian tubes, and cervix. Tubes, valves and pumps move air and water through the system to simulate the body's natural circulation. Chemical communication is stimulated by injecting a pituitary hormone, which causes the cells to respond by secreting estrogen and progesterone at levels typically found during ovulation and menstruation. In addition, the researchers are able to replicate what happens to hormone levels shortly after conception.

Although the system does not provide a complete model of the reproductive system, it could yield insights into some of the causes of recurrent miscarriages. It will also be used to study new birth control methods and to develop individualized treatments for a variety of female reproductive conditions.

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One downside of the proliferation of 3D scanners and printers is that even high-security keys can be rather easily duplicated. Electronic keys provide added security, but require regular battery maintenance and can be quite costly. Now, a highsecurity lock-and-key combination called Stealth Key essentially turns the common mechanical key inside out, concealing the security features to make the key not only unscannable but nearly impossible to copy.

The locksets and keys are shaped like a half-cylinder, with all of the grooves, teeth and indentations hidden inside. They are manufactured out of titanium using (ironically) a 3D metal printer, employing a technique known as selective laser welding (SLM) in which layers of metal powder are fused together with lasers. The level of complexity is virtually unlimited, but the process is time-consuming — taking the better part of a day to make one key. A lockset-key combination costs about \$200; however, replacing one requires a security check, and only the manufacturer will have access to the digital files.

For information: UrbanAlps; website: https://www.urbanalps.com/en/

## Reducing Crime with Al

A recently published study from the National Bureau of Economic Research indicates that artificial intelligence (AI) could help judges determine whether defendants should await trial in jail or at home. An algorithm, created by economists and computer scientists based on data from hundreds of thousands of cases in New York City, was tested on more than 100,000 unrelated lawsuits. The algorithm assigns a risk score based on the current case and the defendant's criminal history. It also considers age, but does not utilize any other demographic data, including race or socioeconomic status.

A comparison of the results showed that the algorithm was better than human judges at predicting whether or not defendants posed a risk of committing a crime if released. A policy simulation indicated that using the algorithm as a type of "judge's assistant" could reduce the number of crimes committed by defendants awaiting trial by as much as 25 percent without increasing the jail population. Looked at from another perspective, the jail population could be reduced by 40 percent without an increase in the crime rate. In addition, these gains are possible while reducing the disproportionate number of African-Americans and Hispanics being held in jails.

It's important to note that this study considered a single variable on which to base algorithmic rules for making predictions. In real practice, judges may consider a broader set of variables, including the severity of the crime and racial inequities. While machine learning can be a valuable adjunct to human decision-making, it is only one component of a broader framework that should include strategies for identifying desired outcomes and reducing bias.

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# Augmented Reality Remodeling

A leading technology-driven manufacturer of highly customized interiors has developed a proprietary augmented reality (AR) system that superimposes images of potential renovations over existing spaces, allowing clients to view the space in 3D before it's built.

The 3D design and manufacturing software, dubbed ICE®, allows users to explore different design scenarios while they're in the space, and automatically captures pricing information for materials, engineering, manufacturing and installation. The system can also move walls and flag unsafe structural configurations. It runs on Microsoft's HoloLens and Google's Tango platforms, is CAD compatible, and supports common file formats to make contract bidding seamless.

For information: Barrie Lorberg, Dirtt, 7303 30th Street S.E., Calgary, Alberta, Canada T2C 1N6; phone: 403-723-5000; website: https://www.dirtt.net/

## Spray-On Touchpad

Most of us are accustomed to touch-sensitive surfaces being built into flat, rigid structures such as a tablet or smartphone screen. But engineers at Carnegie Mellon have come up with a conductive paint that can turn nearly any surface into a touchpad easily and inexpensively, enabling objects and surfaces that were previously static to become responsive and interactive.

Called Electrick, the new material is compatible with a variety of manufacturing methods, including spray/brush coating, casting/molding and vacuum-forming. It can be applied to many types of surfaces — large or small, flat or irregular. It utilizes a principle known as electric field tomography that can be used in conjunction with electrically conductive wires to replace physical buttons.

For example, the team turned an entire wall into a touch sensitive light switch by coating it with the paint and attaching it via copper wires to a computer. Tapping the wall turned the lights on and off, while swiping a finger across it increased or decreased the brightness.

In another demonstration, they created a touchsensitive steering wheel, which could be used in an autonomous vehicle to determine when a human was driving.

Electrick touchpads are 99 percent accurate at detecting touch; however, they can be off by as much as a centimeter in determining the precise location of that touch. Although this limitation will restrict the technology's usefulness for certain applications, it still holds promise for use in many large-scale installations where this level of precision is adequate.

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# X-Ray Vision for Surgeons

In another example of combined off-theshelf technology and innovative software development, a new augmented-reality (AR) system may someday transform surgery. Using a Microsoft HoloLens headset as a platform, the next-generation AR device is designed to superimpose images of a patient's internal organs — derived from magnetic resonance imaging (MRI) and computed tomography (CT) scans — externally onto his or her body, giving surgeons a virtual 3D map as a guide. It also displays digital data to provide access to patient records on the spot.

The goal is to improve the accuracy of minimally invasive surgery (also called keyhole surgery) which is performed through several tiny incisions rather than one large one. The potential benefits for patients include lower risk, shorter recovery times and better outcomes.

Although it's not yet ready for use on humans, the system could eventually improve access to cutting-edge treatments by enabling less experienced clinicians to perform complex procedures.

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New voice apps are making it increasingly possible to imitate a person's speech easily and precisely. Originally developed as an assistive technology for people at risk of losing their ability to talk (due to cancer or surgery, for example), the ability for virtually anyone to clone speech patterns opens up a host of issues from harmless pranks to serious security breaches.

The apps are available for a variety of languages, including French, English and four widely spoken Indian languages. To develop a simulated voice library, these apps require anywhere from 50 to a few hundred phrases/sentences, and they work using even decent-quality recordings, such as YouTube videos.

The apps store snippets of speech as short as five milliseconds long that can be shuffled together to create words. And developers are already planning to enhance the apps to add emotive qualities (like happiness and sadness) to individual words or phrases.

Although there are many constructive applications for this new technology, it will likely render current voice security systems obsolete.

Tests performed using one of the available apps demonstrated that it was able to fool a bank voice biometric system 80 percent of the time. And humans (with supposedly better abilities to discern subtle sound differences) were only able to detect the cloned voice with a reliability rate of 50 percent.

For information: CandyVoice; website: https://candyvoice.com/ | Festvox; website: http://festvox.org/ | Baidu; website: http://www. baidu.com/ (Chinese) | VivoText; website: https://www.vivotext.com/

### Avoiding Organizational Complacency

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in tomorrow—it can mean much more than the commonly accepted definition.

From an anticipatory point of view, change means continuing to do something in essentially the same fashion, with only some minor variation. Build a product a little bigger, smaller or faster. In the case of services, make them more responsive or cost effective. Tinker here and there to make incremental improvements.

Change can also go beyond a product or service itself. Increasing the marketing budget, hiring more staff or getting a new ad agency will all create change.

In effect, change is different, but somehow the same. It's not identical, but it's still something of a variation on an existing theme.

Transformation lives on an entirely different level. Transformation means doing something utterly and radically different. When you transform something, you make whatever came before it outdated, if not completely irrelevant. There's no tinkering or adjusting involved—just about everything is drastically different.

The distinction between change and transformation is everywhere you look. In the early 1990s, Barnes and Noble superstores changed how we shop for books. A few years later, Amazon was transforming how we shop for books, which then transformed how we shop for everything. Blockbuster changed how we watched movies; by contrast, Netflix and other streaming services utterly transformed how we watch movies.

Those and other examples like them also illustrate

the possible ramifications that exist when comparing change and transformation. In contrast to other major booksellers, Barnes and Noble has survived, primarily through diversification of its product line and adding other services. But survival doesn't preclude struggling—in its most recent quarter, instore sales fell more than 8 percent.

Mere change wasn't as kind to Blockbuster, Blackberry and a host of others.

Compare that with companies that transformed what they did and how they interacted with customers. As of the fourth quarter of 2016, Amazon reported revenue of more than \$43 billion, an increase of some 22 percent over fourth quarter 2015 results. And its stock price just passed the \$1,000 mark. Likewise, Netflix in April 2017 reported higher than expected earnings.

Those sorts of eye-opening comparisons show how costly mere change can be in an era that mandates transformation. By the same token, it also underscores what is possible when an existing product or service is transformed into something utterly new and different.

#### Turning Change into Transformation

It's clear that mere change can be a decidedly risky business. So, that begs an initial question—how can you take change and essentially make it into the sort of transformation that's absolutely necessary?

Start by taking a close look at your organization's products, services and other activities. If they're not the same as they used to be, consider the degree to which they're different. Look back at some of the words I used to associate with change—bigger, smaller and so on. Those and other similar terms suggest nuance, a slight adaptation to something that already exists. A logical, incremental evolution. That's change.

If what you're looking at is mere change, consider the next logical question—what can you do to propel a product or service into the realm of transformation? Here, it's helpful to reexamine other examples of what I mean by transformation. For those who can remember getting up to change the channel on your TV, you can remember when most everyone who listened to music bought vinyl records. That was followed by eight-track tapes, cassettes and CDs.

Consider that continuum. Admittedly, they represented forms of improvement. I switched from vinyl records to CDs not just because they were smaller, but because they didn't have the hiss and pops that my record albums had due to a lot of listening and parties. And CDs had the "cool" factor over cassettes. But those were all forms of change, nonetheless.

Today, I don't know where your record albums, cassettes or CDs are—most likely with my film camera somewhere. Today, I have all of my music, all of my photographs, all of my movies and access to the world all from my smartphone. That didn't change how I listen to music; it transformed it. Access, cost, quality, flexibility of purchase and other elements were all dramatically impacted—and for the better.

That's transformation. Transformation differs from change because it completely disrupts the status quo. Moreover, transformation is a one-way street. Once you transform something, there's no going back. Granted, there are people out there who still purchase and listen to vinyl records, but it's safe to say most consumers aren't giving serious thought to retreating back to using records, cassettes or CDs.

Using these and other examples can kick-start your thinking about taking change and ramping it up to transformation by focusing on redefining or reinventing just about everything.

Moving from change to transformation can also boil down to a simple question: "How can I offer my customers the ability to do what they would want to do if only they knew it was possible?" In other words, rather than merely changing or even improving something, what utterly new product or service would people genuinely embrace if they were aware of it and what it could do for them?

No customers asked for an iPhone or an iPod, yet they were transformational. Transformation can also occur by applying an existing product or service in a completely different way. Consider GPS—by conventional definition, it's associated with planning trips and getting vehicles from A to B as efficiently as possible. Consider how John Deere transformed agriculture using GPS, something that we now refer to as "precision farming"—farmers pinpointing specific areas by the square inch for planting, harvesting and much more.

#### Even Better: Jump Right to Transformation

Trying to move something from the realm of change to transformation is vital in today's quickly evolving environment and economy. So, why make the journey needlessly slow? Rather than looking to change something, why not aim for transformation from the get-go?

Here, my Anticipatory Organization Model can be of vital help. Using concepts such as Hard Trends (those trends we know for certain will take place) and Soft Trends (those trends that may or may not happen but are open to influence), ask yourself how your field or business can be transformed in the next few years in ways that enable those trends.

How you answer those questions can help you begin developing strategies and ideas to help you transform the products or services you offer. Further, they can boost your thinking about utterly new ideas that will impact not only what you manufacture or sell but also how you communicate and collaborate with those around you.

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