October 2016
VOL. XXXII, NO. 10

Daniel Burrus'

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TECHNOTRENDS® NEWSLETTER

The biggest ideas that are changing everything

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What You Can Learn From the Recent Airline Tech Glitches That Caused Massive Delays

By Daniel Burrus, CEO of Burrus Research

Delayed flights are every traveler's worst nightmare. The sight of water being handed out at a departure gate is usually an early indicator that your day is not going to turn out the way you had meticulously planned. Traditionally it's Mother Nature who usually gets the blame for overcrowded airports filled with passengers sleeping wherever they can find a bit of space. But the reality is something that may surprise you.

Did you know that bad weather is only responsible for around 5 percent of airline delays? An incredible 323,454 flights were delayed in 2015 because of self-inflicted airline problems. To put this into perspective, 20.2 million minutes of delays in 2015 were caused by the airlines themselves.

Here in 2016, there is another trend that is even more concerning and highlights the effects of underinvesting in technology across an entire industry.

In the past few months we have witnessed three major incidents. Southwest Airlines (LUV) was forced to cancel more than 1,000 flights following a system failure in July. Delta Airlines (DAL) was hit by a global computer outage in August that caused over 2,000 flight cancellations and widespread chaos.

Over in the UK in early September, British Airways was forced to apologize to its passengers for long delays caused by an IT glitch that hit its check-in systems around the world.

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Do you notice a pattern here? Should we be surprised that these major system outages are also responsible for a dramatic slump in share prices for the affected airlines? This recent spate of computer failures is exposing a massive vulnerability across the entire aviation industry.

Although it's true that many airlines secretly pad out flight times at congested airports to disguise system delays, there is no way of hiding from the damage caused by an entire system failure. With three incidents in three months, it won't be long until passengers will be blaming airlines rather than the weather for their lost hours of productivity.

Customers now have access to a wealth of technology, and their expectation levels are constantly increasing. This digital age of instant gratification ensures that we can order a cab, reserve a table at our favorite restaurant or even book accommodation on the other side of the world with a few taps of our smartphone screen.

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TECHNOLOGY NEWS HIGHLIGHTS

From Toilet to Tank

The widespread adoption of hydrogen-fuel-cell vehicles has been agonizingly slow, due in large part to what's been termed the "chicken-and-egg" problem: until an infrastructure of hydrogen fuel stations exists, no one will buy hydrogen cars – but no one wants to build the fuel stations unless there are cars to support them. Toyota has remained committed to hydrogen as the best alternative for zero-emissions cars of the future, going so far as to make over 5,000 of its fuel-cell-related patents available to the industry royalty free. And now it may have found a way around the problem of hydrogen supply with a process for turning sewage into hydrogen fuel.

Microorganisms are added to sewage sludge (the by-product of wastewater treatment) to break down the solid waste and produce biogas, which is about 60 percent methane and 40 percent carbon dioxide (CO_2).

The CO_2 is filtered out and water vapor is added, creating a mixture of CO_2 and hydrogen. When the CO_2 is filtered out again, the result is pure hydrogen.

The beauty of this process is that it can be set up at any wastewater processing plant, so it can be automatically scaled up to meet the demands of even the largest cities or scaled down to bring hydrogen production capabilities to smaller locales. In addition, biogas is a better source of hydrogen than natural gas – and it's totally renewable.

There are other upsides for hydrogen as compared with battery power when it comes to consumers. The ability to refuel quickly, longer range, and bigger vehicles will improve the chances of convincing drivers to give up their gas-guzzlers. In addition, the cost of a fuel-cell car should be more comparable to that of current gasoline models – within a few thousand dollars over the next ten years.

For information: Toyota Motor Company;
Web site: https://ssl.toyota.com/mirai/#

New Level of Artificial Intelligence

We generally think of computers as nothing more than machines that must be programmed to deliver results based on human input. But researchers recently demonstrated that computers are capable of learning based solely on observation, without being programmed what to look for.

The breakthrough study used a technique called Turing Learning – named after Alan Turing, the British mathematician who, in 1950, defined artificial intelligence (AI) as the ability of a machine to exhibit behavior indistinguishable from that of a human. In the study, an AI system observed the movements of two robot swarms: one programmed to move according to simple but unknown rules (agent) and one moving in random and meaningless ways (model). While the agent swarm remained constant, the AI classifier and the model swarm evolved over a series of guesses by adjusting in a complementary fashion and driving each other to get more accurate with each iteration. With no input as to which attributes it was comparing, the AI algorithm was able to identify the rules that governed the movements of the agent swarm.

The applications for this research are vast. For example, such a system could be used to monitor the health of livestock by detecting abnormalities in behavior. It could also improve understanding of collective animal behaviors, including of schools of fish or bee colonies, with the goal of better protecting them from negative environmental influences. The technique could also be used to analyze human movements and provide insights into human psychology, including identifying potentially dangerous behaviors.

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Edible Packaging

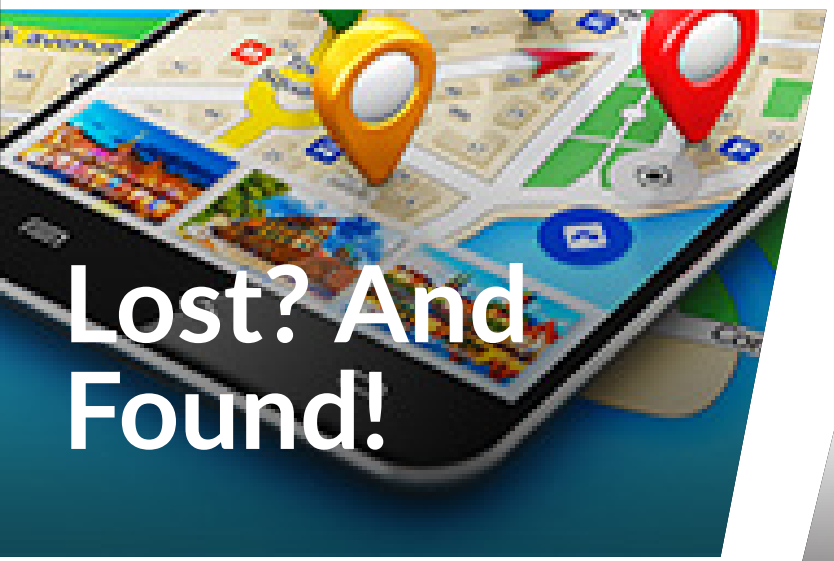
The United States Department of Agriculture recently developed an edible food packaging film that could cut down greatly on non-recyclable, non-biodegradable waste. The protein-based film is also up to 500 times more effective than petroleum-based plastics at preventing spoilage, and doesn't leach potentially harmful compounds into the food.

Most currently available edible packaging products are made from starch; however, their relatively porous molecular structure allows oxygen to seep through, causing food to spoil. The new film is made of a milk protein called casein, and has smaller pores that are more effective oxygen blockers. It also incorporates citrus pectin for added strength as well

as resistance to humidity and high temperatures.

The product looks much like store-bought plastic wrap and has virtually no taste, but flavorings and nutritive additives like vitamins and probiotics could be added in the future. While its application is currently being tested as packaging for single-serving food wrappers such as cheese sticks, the protein-based material could also be sprayed on cereals in place of sugar coatings to prevent them from getting soggy in milk. The casein coating could also be laminated onto cardboard containers and plastic pouches, offering a safe, biodegradable alternative to the recently banned perfluorinated materials used in pizza boxes and other packaging. The developers anticipate that the new film will be hitting store shelves within three years.

For information: Peggy Tomasula, United States Department of Agriculture, Agricultural Research Service, Eastern Regional Research Center, 600 East Mermaid Lane, Wyndmoor, PA 19038; phone: 215-233-6703; email: peggy.tomasula@ars.usda.gov; Web site: https://www.ars.usda.gov/research/



Lost? And Found!

A new device about the size of a quarter allows you to track anything without an expensive GPS system or costly monthly subscriptions. Called TrackR, the small device allows you to keep tabs on your keys, wallet, purse, car and even your pet, using your smartphone.

TrackR attaches easily to any object, and links up with an app on your iPhone or Android device. Lose your keys (again)? A tap of your finger will activate the item ringer to let you know where they're hiding. A distance indicator even lets you know how far away they are. And if it's your phone that you misplaced, pressing a button on the TrackR will ring it even if it's silenced. The app is also programmed with separation alerts to notify you before you leave something behind.

Each device has a Bluetooth range of 100 feet, but TrackR's Crowd GPS Network will provide a GPS map update whenever another user is within range of your item. For example, forget where you parked your car?

Up to ten devices can be tracked with a single smartphone. The TrackR lists for $29.99 (lower in quantities of five or ten) and can be laser-engraved with your name, phone number or even an image when ordered via the manufacturer's Web site.

For information: TrackR; phone: 800-850-9104; Web site: https://www.thetrackr.com/

Smart Bricks

A pan-European initiative known as "Living Architecture" is addressing the issue of global

sustainability by combining architecture, computing and engineering to research smart technologies that can be incorporated into the buildings of the future.

For example, smart bricks that recycle wastewater and generate solar electricity are being developed to create "living walls" for housing, office spaces and public buildings.

Each brick is essentially a miniature bioreactor (a microbial fuel cell, or MFC) containing a variety of microbial organisms and algae specifically chosen for their ability to purify water, remove phosphates, generate electricity and produce detergents – all as part of one process.

The bricks will also contain sensors to monitor internal and external environmental conditions as well as building occupants.

Each brick can be programmed to utilize a variety of inputs (such as grey water, sunlight, microbes and carbon dioxide) to produce a variety of outputs (like clean water, electricity, oxygen, fertilizer and biodegradable detergents) based on the load generated by the building occupants.

The smart bricks will allow researchers to explore the vast potential for MFCs to become active components of our living environments.

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Alzheimer's Vaccine

Worldwide, more than 7.5 million cases of Alzheimer's disease (AD) are diagnosed each year, and the World Health Organization (WHO) has projected that the total cost of dementia-related illnesses is more than $600 billion annually. Yet treatments for AD are still elusive. Between 2002 and 2012, over 400 clinical trials were conducted on nearly 250 compounds, resulting in only one being approved for temporarily alleviating the symptoms of AD. But recently, researchers in the United States and Australia made a breakthrough discovery in the search for a vaccine that targets the tau proteins and abnormal beta amyloid associated with AD.

AD and dementia suffers exhibit high levels of these broken-down proteins inside their brains. The vaccine works with the immune system to latch onto those proteins and haul them away, much like a tow truck would remove a broken-down car from your driveway.

Even more encouraging was the fact that, although beta amyloid was found to be the prominent driver of the disease, targeting the tau protein appeared to actually reverse its progression. In addition, the vaccine does not appear to trigger any auto-reactive immune response. It is anticipated that human clinical trials will begin in two to three years.

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Full-Body 3D Scanner

A group of students has successfully prototyped a three-dimensional scanner large enough to scan a full-size human. The subject stands on a turntable that rotates 360 degrees at a slow speed while a projector and high-definition camera move along the entire body. Unlike commercially available 3D scanners, which employ multiple cameras and can cost up to $200,000, the newly designed version is far more affordable.

While the less expensive design sacrifices some of the precision of a more complex machine, it is still more accurate than traditional anthropometrics and has the potential for widespread application in several fields. For example, the 3D model could be used by fashion designers to produce high-end clothing for clients without the need for fittings. In the medical industry, it could be used to more accurately measure a patient for a prosthetic limb. And, of course, in the entertainment industry, it could be used to create more realistic graphics and cartoons.

The students are looking into ways of improving the accuracy even further while reducing the time required to complete a scan. They will also evaluate the form factor to make it more compact and portable.

For information: Nguyen Dai Ma Lap Phong, Hanoi University of Science and Technology, 1 Dai Co Viet Road, Hanoi, Vietnam; Web site: http://en.hust.edu.vn/home

Video Sunglasses

Snapchat appears to be making a shift away from messages that disappear after being viewed to creating video "Memories." In a recent announcement, the company revealed plans to launch a new line of video-enabled sunglasses while changing its name to Snap, Inc.

According to the announcement, Spectacles (as the new glasses are called) will be available "soon." Touted as having one of the smallest wireless cameras in the world, the integrated video system will record images from the perspective of the wearer with a 115-degree field of view, and is capable of capturing a full day's worth of video snippets on a single charge. The glasses connect to Snap software using Bluetooth or WiFi.

So what makes Snap think that Spectacles will be more successful than Google Glass? With more than 100 million registered current users generating a reported 10 billion videos per day, the company is likely banking on its built-in user base. But, more importantly, it's been rumored that Spectacles will be priced at under $150 a pair, compared with $1,500 for Glass.

For information: Snap, Inc.; Web site: https://www.snap.com/en-US/ or https://www.spectacles.com/

What You Can Learn From the Recent Airline Tech Glitches That Caused Massive Delays

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It seems that a combination of legacy technology and legacy thinking is directly responsible for slowing air travel. The harsh reality the industry needs to face is that much of our 21st-century transportation system is running on 20th-century computer systems. In addition to the current infrastructure problems, there is an increasing awareness around the security and encryption that allows air traffic control to protect the planes in the sky.

The modern pressures of this digital age have seen many airlines getting caught up in a race to simplify the whole customer journey. We now take it for granted that we can store our boarding pass on our phone rather than printing several documents before heading to the airport.

The problem is that backend systems have become an eclectic mix of old and new IT applications and infrastructure. More and more applications have been added on top of the legacy technology, and IT directors admit that sometimes there is nobody who completely understands how every aspect of the system works.

The only way to fix a problem of this scale is to reverse-engineer everything. This of course involves a considerable amount of both time and money. A combination of legacy computing systems and 24-hour uptime requirements has created a dilemma for the entire industry and an even bigger headache for IT departments caught in the middle of what seems to be a no-win situation.

There is an argument that IT disasters of this scale are typically rare beasts. But three within three months is an indication that the old way of doing things is starting to become a liability. Traditional businesses have IT departments that insist on scheduling hours of downtime for emergency maintenance, but the airline industry does not have this luxury.

Legacy systems that are complex by design have high reliability and availability standards that are notoriously difficult to support. However, this is not an excuse to neglect their aging IT infrastructure.

Any IT professional will happily speak of a belts–and-braces approach to ensure that they fully understand how systems will behave under various circumstances. Servers will occasionally glitch or become vulnerable to an outage, which is why resilience is crucial. Service disruptions will always come when they're least expected. The creation of an efficient disaster recovery solution is no longer just nice to have—it's a must-have.

The recent Delta outage revealed that 300 of Delta's 7,000 data-center components were discovered to not have been configured appropriately to available backup power. The development of an increasing number of customer-facing applications and services—at the expense of maintaining its backend IT system—could be responsible for costing Delta $150M.

The introduction of mobile apps and online boarding passes for passengers also makes

any form of downtime unthinkable. But the overlapping of complex legacy IT systems with new digital technologies that have been cobbled together is a recipe for disaster.

Southwest, Delta and British Airways have unwittingly provided an insight into the real cost of a system failure during the height of summer. But many people are asking how the loss of power or failure of software could have crippled airlines in 2016. The reality is that those turbulent few weeks illustrate the need for airlines to invest in their IT infrastructure and replace it with new systems where appropriate.

In this digital age it's the shiny tech and gadgets that will quickly win the hearts of business leaders. Meanwhile, anyone outside of IT traditionally struggles to see the importance or ROI of a data center, yet they insist that it's unacceptable to experience a technology failure.

Underinvestment and dependency on multiple layers of systems are nothing new. Fear of failure is also frequently the cause of delaying significant network upgrades. However, we all know how it ends if we do nothing about it.

It's unsurprising that both the airline industry and technology experts have warned that more disruptions are likely.

The recent events have caused all airlines to foresee problems on the immediate horizon. The companies with the confidence to act on these certainties will have the biggest advantage in tomorrow's market. If they refuse to prepare for the inevitable, a new airline with a state-of-the-art computer system could quickly disrupt an industry of dinosaurs that refuse to evolve.

In times of great uncertainty, we must ask ourselves what we are certain about. We know that aging IT infrastructures are starting to cause major airlines a whole heap of problems. We also know that ignoring these issues could cost hundreds of millions of dollars and even put established airlines out of business.

Technological change is not something to be feared; rather, it should be seen as an opportunity to create a competitive advantage. Our always-online society refuses to accept the concept of downtime, so what is your business doing to prepare for this new level of expectation?

We know for certain that IT glitches will continue to happen, and they will hit global check-in systems. As tech addicts we have come to understand the familiar "we appreciate your patience as our IT teams work to resolve this issue" message. But make no mistake—all companies will be judged by how quickly they can restore their service.

A lack of communication, update or any sign of progress during any major technical incident will tell the public that the company is unprepared and does not know what it is doing. Disaster recovery scenarios are often at the bottom of most organizations' priorities—until they lose hundreds of millions of dollars and their share price takes a tumble.

Being anticipatory rather than reactionary allows us to see much of what is going to happen, so why don't we use this information to take action before the problem happens and position for success rather than risk failure? This simple approach will save your reputation, profits and even future, so what are you waiting for?

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