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TECHNOTRENDS® NEWSLETTER

*The biggest ideas that are
changing everything*

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10 Technology Driven Hard Trends Shaping 2016

By Daniel Burrus, CEO of Burrus Research

It has been widely reported that we should expect more than seven billion people and businesses, and at least 30 billion devices, will be connected to the Internet by 2020, so it should be of no surprise that this tech-driven economy is here to stay. Technology has become everyone's business as we enter the next stage of this digital transformation where even your next toaster or refrigerator will connect to the Internet.

A rapidly increasing number of companies are learning the importance of identifying Hard Trends that are both predictable and measurable. This gives companies a competitive edge in a world where thriving on change has become necessity. Pandora's box is officially open as users not only bring their own devices but wear them too leaving the traditional IT department with little chance of getting it all back in the box.

Many of the themes that we have witnessed here in 2015 will gather pace next year and continue to enable or disrupt your business depending on how prepared they are for the Hard Trends on the horizon. In this article, I'll highlight ten technology-driven Hard Trends that I would like you to spend time thinking about and better yet, act on.

1. The Continuing Rise of Shadow IT

Businesses have grown tired of IT departments failing to deliver on long projects or constantly saying no to their ideas and started to see them as a frustrating disabler rather than the enabler that they crave. When they don't get the answer they

want in 2016, they will only pick up the phone and order an attractive software as a service (SaaS) solution that can be up and running incredibly quickly without all the hassle that historically came with large software implementations. And let's not forget the various forms of hardware as a service as we have seen with Amazon, Microsoft and a host of other cloud services.

Doubters only need to look at the warning signs learned from Slack that became the fastest-growing workplace software ever this year and, for the most part, this was achieved under IT's radar. Users quickly grew tired of working with the familiar but increasingly dated office tools, and

“ *Technology has become everyone's business as we enter the next stage of digital transformation.* ”

when the tech guys failed to lead the way, they found their own solution to collaborate and share documents in real time leading to a reduction in emails and inefficient and often pointless meetings.

2. Virtual Reality Gets Real

Facebook raised a few eyebrows when it closed in on its \$2 billion Oculus Rift acquisition, but it's 2016 where heavyweights such as PlayStation

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TECHNOLOGY NEWS HIGHLIGHTS

LED Hotspot

A ground-breaking technology known as Li-Fi could be the next big thing in data communications. And it would turn every LED lightbulb into a wireless hotspot, enabling secure, high-speed, ubiquitous data networks.

First introduced in 2011, visible light communications is now being tested in real-world office and industrial environments, where researchers have achieved speeds as high as 224 Gigabits per second (Gbps). Although, at that rate, you would be able to download 18 full-length films in one second, the goal for bringing Li-Fi to market is a mere 1 Gbps (which is still about 100 times faster than current Wi-Fi technology). It works by modulating the intensity of LED bulbs at very high speeds.

Li-Fi technology brings with it several benefits. First, because it uses bulbs that are already providing

illumination, it costs virtually nothing to operate in terms of energy. In fact, the bulbs can be turned down to the point where they appear to be off and still transmit data. Secondly, Li-Fi is less expensive to install than Wi-Fi and would provide free data access anywhere there's a lightbulb. Finally, Li-Fi is more secure. Because light doesn't penetrate walls, data is only available to users in the same room.

Drawbacks of the technology include the fact that it doesn't currently function outdoors, and light pollution can present issues. However, the developers are confident that Li-Fi will someday replace unsightly radio frequency towers.

For information: Harald Haas, pureLiFi Ltd., Edinburgh Technology Transfer Centre, Alrick Building, Max Born Crescent, EH9 3BF, Edinburgh, United Kingdom; phone: +44-131-472-4807; email: info@purelifi.com; Web site: [www. http://purelifi.com/](http://purelifi.com/)

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Robot Imagination

Researchers are working on brain-inspired algorithms that could revolutionize the way in which robots are deployed. By simulating the learning processes that occur in a biological brain, robots could actually learn how to deal with unfamiliar situations, rather than needing to be programmed for specific tasks.

One example is Darwin, a “robot toddler” that has already learned how to perform various actions by “imagining” how to do them, and then practicing a series of tasks. A high-level deep-learning network responds to the dynamics of the robot’s actuators and sensors, as well as their responses to environmental factors, while providing overall guidance to carry out the required movements.

So far, Darwin has learned how to stand, reach with its hand, and maintain its balance on an inclined surface; however, researchers continue to add more variability to the tasks. By giving them the ability to learn “on the fly,” these complex algorithms may open up a whole new world of applications for robots to act more reliably and efficiently in the real world. In the shorter term, deep-learning will be particularly useful for improving locomotion of humanoid robots, which have historically struggled with walking on uneven surfaces or becoming unbalanced when reaching out for objects.

For information: Pieter Abbeel, University of California at Berkeley, Electrical Engineering and Computer Sciences, 746 Sutardja Dai Hall #1758, Berkeley, CA 94720; phone: 510-642-3214; email: pabbeel@cs.berkeley.edu; Web site: <http://www.berkeley.edu> or <http://www.eecs.berkeley.edu>



Anti-Aging Drug

An anti-aging drug that is purported to allow people to live well into their 100s is scheduled to enter human clinical trials in 2016. If successful, it may prove to be the most important medical intervention of the modern era.

Originally developed for diabetics, it was recently found that patients with type 2 diabetes who were treated with the drug Metformin could live longer than people without diabetes. It has already been demonstrated to have anti-cancer and anti-cardiovascular disease properties, and can reduce the chance of developing diabetes in pre-diabetics by one third.

Metformin is actually one of the less expensive pharmaceuticals available, and works by allowing more oxygen to be released into the cells. Studies on mice showed that it increased their lifespan by 20 percent.

In 2012, the United Nations estimated that there are over 300,000 centenarians worldwide, however, that number is expected to increase quickly in the coming years. For example, the Office of National

Statistics in the United Kingdom projected that one in three babies born in the U.K. in 2013 will live to be over 100 years old.

For information: Craig Currie, Cardiff University School of Medicine, Institute of Primary Care & Public Health, Pharma Research Centre, Cardiff Medicentre, Cardiff DF14 4UJ, United Kingdom; phone: +44-02920-757744; email: currie@cardiff.c.uk; Web site: <http://www.cardiff.ac.uk/>



Smartphone Breathalyzer

A new CMOS (Complementary Metal Oxide Semiconductor) sensor was recently introduced that is small enough and inexpensive enough to bring gas monitoring capabilities to smartphones and the Internet of Things (IoT). Called the CCS811, it's said to be highly reliable, boasts a fast response time, uses very little power (less than 1.2 milliwatts) – and it measures only 1 millimeter square.

An integrated microcontroller subsystem enables direct measurement of volatile organic compounds (VOCs). The sensor can be calibrated to be sensitive to different types of gas making it suitable for detecting carbon monoxide, formaldehyde, nitrogen dioxide and alcohol levels.

In the not-too-distant future, smartphones equipped with the new sensors should become available. Apps for monitoring air quality as well as breathalyzers will likely be among the first applications for the new technology.

For information: Cambridge CMOS Sensors, Deanland House, 160 Cowley Road, Cambridge CB4 0DL, United Kingdom; phone: +44-1223-395551; Web site: <http://www.ccmoss.com/>

Quantum Security

Scientists have developed a method for using quantum technology to create devices with unique identities at the nano-scale level. Known as Q-ID, it works by electronically stimulating a random atomic system to produce a unique pattern without the need for passwords or counterfeit tags. The method can be integrated easily into existing chip manufacturing processes, and is virtually un-hackable, since breaking the code would require pulling apart the underlying structure atom by atom.

The unique patterns can be used for authentication or identification applications. In addition to their primary function of security, Q-ID could enhance logistics by tracking and tracing goods across the supply chain. The technology is being commercialized via Quantum Base.

For information: Jonathan Roberts, Lancaster University, Department of Physics, C57 Physics Building, Lancaster, LA1 4YB, United Kingdom; email: j.roberts@lancaster.ac.uk; Web site: www.lancaster.ac.uk

Quantum Base; email: info@quantumbase.com; Web site: <http://quantumbase.com>



Jetpack for First Responders

Dubai's civil defense authority, along with other Middle East governments, is reportedly considering investing in jetpacks to enhance response time in emergency situations. The technology, which was first developed about 35 years ago, is finally coming to market after several rounds of design enhancement and safety modifications.

The newest version is driven by two ducted fans, which are run by a two-liter, 200 horsepower, two-stroke V4 engine. It has a maximum speed of 74 kilometers per hour (about 45 miles per hour) and can reach an altitude of about 3,000 feet. It will operate for 30 to 45 minutes with a payload of up to 120 kilograms (265 pounds). A low-opening ballistic parachute and carbon fiber pilot module with landing gear provide added safety.

The jetpack can be flown manned or as a heavy-flight UAV (in contrast to typical UAVs which can typically carry only about 8 kilograms). It's expected to retail between \$200,000 and \$250,000.

For information: Peter Coker, Martin Aircraft Company, 39 Ballarat Way, Wigram, Christchurch 8042, New Zealand; phone: +64-3-377-8584; fax: +64-3-982-4614; Web site: www.martinjetpack.com



Air Pollution Detector

Nitrogen dioxide (NO₂) is a deadly form of air pollution that is generated by the burning of fossil fuels. Major sources worldwide include coal-fired power plants and diesel engines. NO₂ contributes to more than seven million deaths annually, according to the World Health Organization (WHO). It's particularly harmful to the elderly, and has been shown to increase the risk of respiratory disorders in children. But the negative impact of NO₂ could be lessened with early detection, so Australian researchers have set out to develop a highly selective and reliable monitoring system that would allow individuals to help avoid NO₂ poisoning by detecting harmful levels in the air early.

The new sensors are not only more cost-effective than current methods, they also outperform any of the solutions available today. They are fabricated by transforming tin di-sulfide (a yellow-brown pigment used in varnish for gilding) into flakes only a few atoms thick to create a large surface area. The flakes are highly attracted to NO₂ molecules, making them very selective in absorbing and identifying the harmful gas.

The new technology represents an important first step in creating personal, handheld sensors that could help improve quality of life and avoid debilitating illness for millions of people.

For information: Kourosh Kalantar-zadeh, RMIT University, Electrical and Computer Engineering, GPO 2476, 124 LaTrobe Street, Melbourne, Victoria 3001, Australia; phone: +61-3-9925-3254; email: kourosh.kalantar@rmit.edu.au; Web site: www.rmit.edu.au/

treating other conditions, including diabetes, kidney disease and cancer.

For information: Thomas Braciale, University of Virginia School of Medicine, Biomedical Sciences Graduate Program, P.O. Box 800738, 1102 Jordan Hall, Charlottesville, VA 22908; phone: 434-924-9233; email: tjb2r@virginia.edu; Web site: www.medicine.virginia.edu/

Blood-Boosting Antibody

Researchers may have discovered a way to “switch on” the body’s natural production of red blood cells with the simple injection of an antibody, a breakthrough that could eliminate the need for blood transfusions and help fight a myriad of diseases.

In a routine laboratory experiment on mice, while examining the role of lung cells in immune function, it was discovered that injecting a particular antibody induced a condition in the mice known as “stress erythropoiesis” – a normal reaction to injury or trauma in which the body is prompted to produce more red blood cells. Although more work is required before the technique can even be tested on humans, the findings could have broad implications for medical practice.

In addition to the obvious benefits for battling anemia, the method could be used to treat individuals who, for religious reasons, cannot accept a transfusion. It would also be useful in combat or emergency situations to stabilize those who are injured until they can be given blood. The scientists also believe that the discovery will ultimately represent a significant step forward in

10 Tech Trends 2016

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VR, Facebook-owned Rift and HTC Vive are all expecting to dominate headlines.

It will be fascinating to see just how quickly consumers adopt this latest technology and begin to embrace consumption of VR content, but make no mistake that for better or worse, this will be a game changer as creative applications rapidly multiply.

3. Retail Embraces Location Awareness

Retailers were forced to react last year when

the trend of show-rooming rapidly expanded. Consumers get hands-on with a product in a physical store before looking it up on their smartphones to purchase online. However, there is the realization that these changing habits actually represent an excellent opportunity for retailers to engage with their customers whether they be in-store or online and paid via their debit card, mobile or cash.

Early lessons have been learned, and it's time for Indoor mapping and beacon technology to bring retailers into the 21st century to help the monitoring footfall, dwell time and empower stores to adapt quickly to spending patterns in real time.

4. Cashless Society Moves a Step Closer As Consumers Embrace Mobile and Contactless Payments

The digital payment revolution is being led by Scandinavian countries such as Sweden, who are waving goodbye to pockets full of loose change and enjoying the benefits of using contactless cards or mobile payments where even public transportation often only accepts card payments.

In 2016, Millennials around the world will increasingly find their affiliation with paper money and coins incredibly quaint as they discover the safety they can have using tokenization and biometric identification, as used by Apple Pay, Google and many others, to conduct a transaction without having to share credit card numbers and personal information during a transaction. Think of it this way; by eliminating the transfer of credit card information, there is nothing for a hacker to steal.

5. Cognitive Computing Will Increasingly be Used To Extract Value From Big Data

Big Data has been a buzzword floating around for a few years, but in 2016 we will begin to unlock the real power and value thanks to the rapid



growth of cognitive computing. Self-learning data systems are increasingly able to automate tasks and mimic the way a human brain works to predict pattern trends and prevent problems before they arise.

Machine learning, artificial intelligence (AI), natural language processing (NLP) and deep learning are just a few of these technologies that will finally allow companies to make sense of the ever-growing variety, and velocity of big data.

6. The Internet of Things (IoT) Gets Personal

More and more everyday items that we buy for our home will be ready to connect to the internet straight out of the box to provide a wealth of data about you and your home. Productivity obsessed professionals will begin to create their personal dashboards that allow them to manage and tweak their everyday lives.

It's only a matter of time before those wearable devices pave a way to provide our doctors with a data export containing our daily calorie intake, exercise, resting heart rate and sleep patterns with just a push of a button. The technology is already here, but 2016 will be the year we realize the power hidden in our data.

7. Security and Privacy Awareness Takes Center Stage

2015 will be remembered for security breaches of



household names and the increasing awareness of how our data is being used or even abused by third party companies. Both users and businesses will begin to take these mathematical problems seriously and start to question exactly who they provide access to exercise vigilance and protect themselves.

Although, the last few years have felt like a gold rush or smash and grab for personal data, we can expect increased use of multiple biometrics to operate our mobile devices as well as much tougher and needed regulation to enforce businesses to act more responsibly.

8. Drones Become Practical

In 2014, Amazon announced their intentions with drone deliveries and much of the world laughed and ridiculed this ludicrous idea. Thanks to a slow moving FAA in the U.S., regulations, and more importantly guidelines have been slow to come as drone manufacturers moved quickly to create new markets. Today, Amazon, Google, and Walmart are just a few who are experimenting with home delivery of their products. Let's also not forget about areal photography, agriculture applications, power line inspectors, and police departments who are all investing heavily in drones.

9. Online Influencers Become the New Celebrities

Digital natives are turning their back on the fake world of celebrity and magazine covers and

searching for an authentic voice that they can relate to. Some YouTube Vloggers already have millions of subscribers and views that eclipse traditional formats such as TV shows or even album sales.

New Media has given birth to a new method of storytelling and collaboration and 2016 will see the continual migration of digital tribes who are forming their own niche online communities.

10. The Personalized Experience

For too long we have all been spoon-fed a generic off the shelf experience that is increasingly irrelevant in this digital age. We now tune into our own online channels that provide us with the news, music, film, books that interest us and everything else never makes it to the our timelines.

2016 will be the wake up call for any business that wants to reach out and engage with their customers or even just get their attention. Our expectations to be treated as the unique individual that we are will mean that marketers will have to up their game or watch helplessly as their customers tune out of those hard sell generic ad campaigns.

In much the same way that the industrial revolution completely changed the landscape a few hundred years ago, it feels that we are caught right in the middle of a digital transformation and those that fail to adapt, and better yet anticipate, will increasingly loose relevance along with market share, and in many cases disappear forever.

The only question that remains is what Hard Trends will you be following to ensure that your business adapts, evolves and overcomes the challenges along the way in 2016?



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