

DANIEL BURRUS'

TECHNO TRENDS

October 2013
VOL. XXIX, NO. 10

THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

In This Issue

**The Cloud-Enabled
Transformation of
Enterprise IT**

**360-Degree Video &
Photos with Smarter Smart
Phone**

Sensor Glove IDs Toxins

Swimming Robot

Bendy Batteries

Bioglass Toothpaste

**World's Most Efficient
"Mop"**

Stopping Light in Its Tracks

iKnife: Sniffing Out Cancer



www.burrus.com



The Cloud-Enabled Transformation of Enterprise IT

By Daniel Burrus, CEO of Burrus Research

Thanks to exponential advances in processing power, bandwidth, and storage (what I call the three change accelerators), the business environment is undergoing a major transformation. I have been tracking the trajectory of these three change accelerators for the past thirty years and they have now entered a predictable new phase—one that will transform every business process. In fact, based on the technology-enabled hard trends that are already in place, including advances in cloud computing and virtualization, over the next five years we will transform how we sell, market, communicate, collaborate, innovate, train, and educate.

In order to fully understand how cloud computing and virtualization will work together in new ways to transform the business world, let's take a quick look at the evolution of each.

Cloud computing, which refers to companies using remote servers that store data and allow users to access information from anywhere, takes three different evolutionary forms.

Most of us first started using a public cloud provided by companies such as Microsoft, Google, or Apple, where we stored documents remotely on their servers, or we used a cloud service like Flickr to store and share photos.

The private cloud soon followed when companies wanted to provide employees secure access to company files from any device anywhere. Since it's private, it's secure and the public does not have access to it. Midsize and large companies have been rapidly establishing private clouds.

continued on page 6

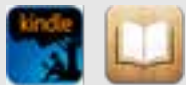
Know What's Next Magazine



In today's world of technology-driven change, it has never been more important to Know What's Next!

Technology is transforming how we sell, market, communicate, collaborate, innovate and educate.

Also available on:

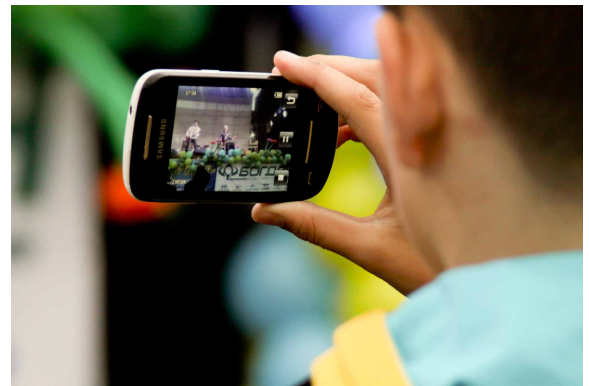


www.burrus.com

TECHNOLOGY NEWS HIGHLIGHTS

360-Degree Video & Photos with Smarter Smart Phone

A new product called Surround-See combines an omnidirectional camera lens with an Android app to give smart phones a totally new level of interactivity.



Panoramic cameras (such as Kogeto's Dot) snap onto a smart phone camera, allowing users to capture 360-degree video and photos. For the most part, the associated apps provide functions for recording, playback and sharing. On the other hand, with the Surround-See app, a phone can be "trained" to recognize its surroundings and monitor activity.

Instead of mounting to the main, rear-facing camera, the panoramic lens is placed on the front, facing the user. If the phone identifies the interior of the user's car, it can automatically block calls and texts as a safety precaution. If it senses multiple faces, as in a meeting, it can be programmed to send calls to voicemail. And if its owner walks away, leaving it on table, it will alert them. The system can even be taught to recognize gestures, for example, allowing a user to mute their phone with a sweep of the hand.

It's been speculated that Apple won't be far behind with a similar feature for the iPhone.

For information: Xing-Dong Yang, University of Alberta, Department of Computing Science, 2-32 Athabasca Hall, Edmonton, Alberta, Canada T6G 2E8; phone: 780-492-3980; fax: 780-492-6393; email: xingdong@cs.ualberta.ca; Web site: www.ualberta.ca Jeff Glasse, Kogeto, Princeton, NJ; Web site: www.kogeto.com

Sensor Glove IDs Toxins



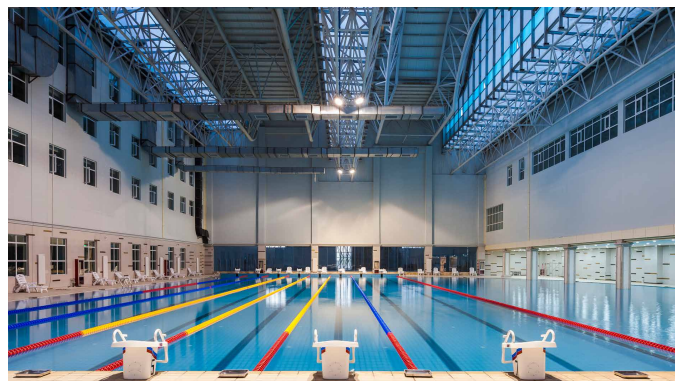
Workers and technicians in chemistry laboratories, semiconductor manufacturing, and other industries handle a variety of toxic substances that cannot be seen or smelled. Highly sensitive measuring equipment and infrared cameras are often used to detect the presence of toxins, but a new glove that changes color when exposed to hazardous materials could provide another level of safety.

Sensor particles that are custom-made to react to specific analytes can be embedded into fabrics using common techniques such as dipping and screen-printing. In the future, a miniaturized sensor module could measure, record, store and even transmit information regarding the concentration of toxins as well as the frequency of exposure.

Other applications for this technology include integrating sensors into food packaging (for example wrappers or bottle caps) to detect spoilage.

For information: Sabine Trupp, Group Manager, Sensor Materials, Fraunhofer EMFT, Josef-Engert Strasse 13, 95053 Regensburg, Germany; phone: +49-941-89967741; Web site: www.emft.fraunhofer.de/en.html

Swimming Robot



Japanese researchers recently demonstrated the world's first humanoid swimming robot. Known as Swumanoid, it can swim the length of a 25-meter pool in less than two minutes, and is capable of doing the crawl, the butterfly or the backstroke.

The resin robot is about 89 cm (35 inches) tall with proportions similar to a competitive swimmer. It's equipped with twenty immersible motors, which propel it through the water using its arms and legs, just as humans do.

Swumanoid will be used to help Olympic contenders improve their technique, and may be used to develop more highly competitive swimsuit designs. Future adaptations could even enable humanoid lifeguards to rescue drowning swimmers.

For information: Motomu Nakashima, Tokyo Institute of Technology, 2-12-1-I3-0 Ookayama, Meguro-ku, Tokyo 152-8552, Japan; phone: +81-3-5734-2586; email: motomu@mech.titech.ac.jp; Web site: www.mech.titech.ac.jp/~dycon2/motomu/index2.html

Bendy Batteries

In recent years, portable electronic devices have been revolutionized with flexible electronic circuits and even bendable displays. However, one bottle-neck to reducing size and increasing flexibility has



been the batteries needed to run them. So developers are looking at a class of devices known as super-capacitors to create power supplies that are smaller, lighter and thinner than ever.

Super-capacitors have nearly the same storage capacity as batteries but can be discharged more quickly, making power more readily available. Although they have been around for a while, the materials used to manufacture them can be costly. Recently, scientists investigated using manganese dioxide as a less expensive and more eco-friendly alternative with excellent results. The manganese dioxide is vaporized with an electron beam and then the gaseous atoms are allowed to precipitate. Layers of gold are also incorporated to improve conductivity. The result is a high energy density power supply that measures less than a half-centimeter wide and can deliver more energy per unit volume than currently available super-capacitors.

For information: Oliver Schmidt, Leibniz Institute for Solid State and Materials Research, Institute for Integrative Nanosciences. Postfach 27 01 16, D-01171 Dresden, Germany; phone: +49-351-4659800; fax: +49-351-4659540; email: o.schmidt@ifw-dresden.de; Web site: www.ifw-dresden.de/en/institutes/iin

Bioglass Toothpaste



A new approach to fighting tooth decay utilizes special toothpaste infused with small particles of glass that block openings in the dentine and can even re-mineralize areas in which cavities have begun to form.

The special glass particles have an open network structure that dissolves quickly in saliva. Because they readily react with water, the toothpaste is formulated with glycerol and a water-soluble polymer which holds the glass particles in place and stops them from being washed away. They then release calcium and phosphate ions, which crystallize to form a structure similar to tooth enamel, known as an apatitic phase. In laboratory tests, a single brushing was effective for occluding the tubules in the tooth surface, forming an apatite-like layer in less than three hours. Regular use will provide better long-term effectiveness by increasing the thickness of the protective layer.

The developers hope to test prototypes of the new toothpaste on a larger scale within the next year, and commercialize the product within two years.

For information: Robert Hill, Queen Mary University, Institute of Dentistry, Francis Bancroft Building, Second Floor, Mile End Road, London E1 4NS, United Kingdom; phone: +44 (0)20-7882-5794; fax: +44 (0)20-7882-7979; email: r.hill@qmul.ac.uk; Web site: www.qmul.ac.uk

World's Most Efficient "Mop"

Although it was discovered more than one hundred years ago, the world's most efficient water absorber – magnesium carbonate (MgCO_3) – was proclaimed to be the "impossible material" because the process used to produce it was expensive and unfeasible. But recently, human error made the impossible possible as the secret to synthesizing the elusive compound was uncovered by accident.



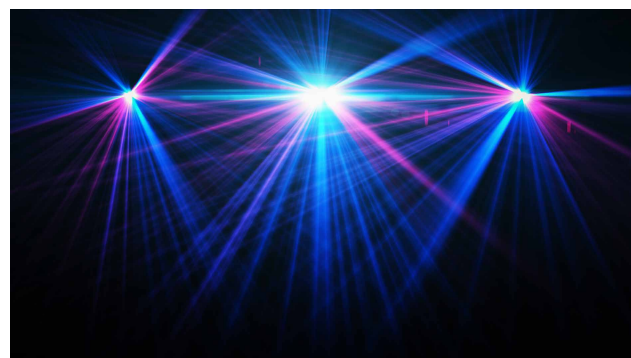
While most "disordered carbonates" can be produced inexpensively by bubbling carbon dioxide through an alcohol mixture, the same method doesn't work for magnesium carbonate. For years, researchers had been altering synthesis parameters in the hope of finding a solution until one day when the material was mistakenly left in the reaction chamber at higher than normal atmospheric pressures over the weekend. It was then that the researchers noted the formation of a rigid gel. It took another year to determine that heating the gel to 70 degrees Centigrade (158 degrees Fahrenheit) would cause it to solidify and collapse into a white, coarse powder.

Upsalite (as the substance is now known) owes its extraordinary "dryness" to millions of miniscule pores, each one-millionth the diameter of a human hair. This has the effect of increasing its relative surface area such that a single gram of the powdered

form has a total exposed surface of 800 square meters. Potential applications for use of the unique material range from removing moisture in industrial environments to cleaning up hazardous material spills.

For information: Maria Stromme, Uppsala University, Department of Engineering Sciences, Nanotechnology and Functional Materials, Box 534, 751-21 Uppsala, Sweden; phone: +46 (0)18-471-723; email: maria.stromme@Angstrom.uu.se; Web site: www.uu.se/en

Stopping Light in Its Tracks



Using lasers and magnetic fields, scientists have set a new record – stopping and storing light inside a crystal for a full sixty seconds. The technique, called electromagnetically induced transparency (EIT) involves firing a control laser at a cryogenically cooled opaque crystal, triggering a quantum reaction that turns it transparent. A second light source is then beamed into the transparent crystal. When the control laser is turned off, the crystal reverts back to its opaque state, trapping the second light inside.

The energy from the trapped photons excites atoms within the crystal, causing them to spin. This spin can be maintained for about a minute and can be released as photons by turning the control laser back on.

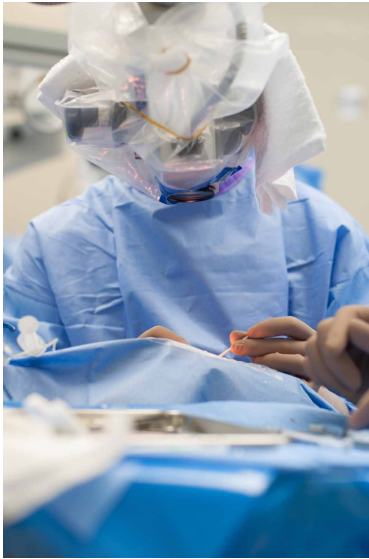
The breakthrough could be pivotal in ultimately developing quantum computer networks with secure optical memory capabilities.

For information: Georg Heinze, Technical University Darmstadt, Institute of Applied Optics, Building S2/07 Room 7, Hochschulstrasse 6, D-64289 Darmstadt, Germany; phone: +49-6151-166553; fax: +49-6151-164123; email: georg.heinze@physik.tu-darmstadt.de; Web site: www.tu-darmstadt.de/index.en.jsp

For information: Zoltan Takats, Imperial College London, Computational Systems Medicine, South Kensington Campus, Sir Alexander Fleming Building, Sixth Floor, Exhibition Road, London SW7 2AZ, United Kingdom; phone: +44 (0)20 7589-5111; email: z.takats@imperial.ac.uk; Web site: www.imperial.ac.uk

iKnife: Sniffing Out Cancer

Electrocautery surgical knives are widely used in operating rooms to seal incisions with heat and thereby reduce bleeding. Now a new, “intelligent” version has been developed that can analyze the smoke generated during the cutting/cauterizing process to determine whether the tissue being cut is healthy or cancerous.



The smoke is sampled and analyzed by a mass spectrometer which identifies particles based on their mass and charge. One type of charged particle commonly found in surgical smoke is fat, and different tissues and cancers have characteristic proportions of different types of fat. So, by comparing samples to a database of nearly 3,000 known standards, cancers and other tissues can be identified with about 95 percent accuracy. Results are delivered in 2.5 seconds or less.

The iKnife will enable surgeons to quickly ascertain the outer margins of a tumor so it can be removed as completely as possible while maximizing the amount of healthy tissue left intact. The device will be undergoing formal clinical trials to confirm whether it improves clinical outcomes for surgical patients.

The Cloud-Enabled Transformation of Enterprise IT

continued from page 1

It didn't take long to see the private/public cloud emerge—also called a hybrid cloud. In this configuration, you have a private part of your corporate cloud that is secure and only accessible by employees, and you have a part of the cloud that is public where strategic partners, vendors, and customers can access limited content.



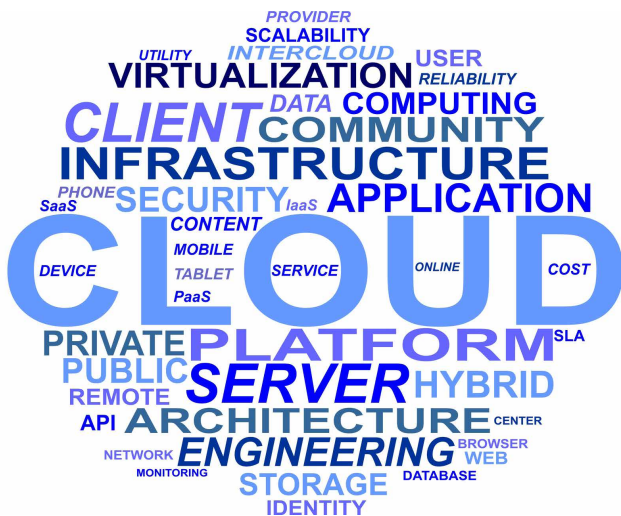
The Game Changer

Cloud computing and virtualization go hand-in-hand, and virtualizing desktops and servers is just the beginning. For example, we're already seeing virtualized processing power. Think of this as accessing a supercomputer in the cloud and having that supercomputer's processing power available on your smart phone or tablet.

Part of this evolution of cloud computing and virtualization is that we can now virtualize large components of IT. We are already seeing IT as a

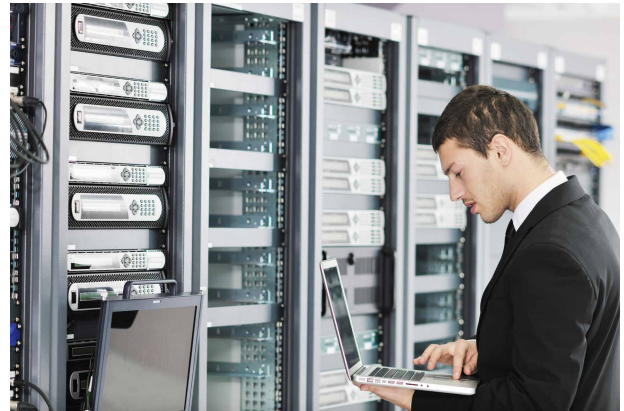
Service, much like how software as a service (SaaS) became popular. This means that much of the IT department will be virtualized as an on-demand service and running in the cloud.

I was in China two months ago consulting with CIOs who were not only using software as a service (SaaS), but several were also in the process of implementing hardware as a service, connectivity as a service, collaboration as a service, and security as a service. The real excitement was around implementing everything as a service (XaaS). Clearly, IT is quickly becoming an integrated collection of intelligent services that are on demand, on the move, and on any device.



The benefits of IT as a service are immense. Not only will it save money, but it can also increase speed and agility. Since your servers aren't being used 100 percent of the time, the efficiency varies. With IT as a service, you can scale in real time as demand dictates by the nanosecond. As sales increase or decrease, the system will instantly self-configure. Now you're only paying for what you're using, meaning you'll

benefit from dynamic resource allocation, maximizing what you have and what you're paying for at all times.



IT as a service is a game changer. Because you now have components of the IT department existing in the cloud, you free your in-house IT staff to shift from a maintenance mode to an innovation mode. As such, your IT department can focus on achieving business goals, creating innovative solutions, and driving sales rather than upgrading individual user's computers and firefighting everyday problems. It allows the IT department to examine the unfolding industry trends so your company can give customers the products and services they would ask for, if they only knew what was possible.

The fact is that the ability to innovate has never been more possible and has never happened faster. In transformational game changing times such as what we're experiencing now, the key rule is this: If it can be done it will be done ... and if you don't do it someone else will.



*Technotrends is published 12 times a year by Burrus Research, Inc., a research and consulting firm that monitors global advancements in science and technology and their direct impact on business and consumers. Mary Norby, Editor P.O. Box 47, Hartland, WI 53029-0047. To subscribe, call **262-367-0949** or email **office@burrus.com**.*
©2013 Burrus Research, Inc.