

DANIEL BURRUS'

TECHNO TRENDS

THE BIG IDEAS THAT ARE
CHANGING EVERYTHING

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What's Your Plan to Leverage High-Value Data?

By Daniel Burrus, CEO of Burrus Research

Recently General Motors announced that they're building a new, \$258 million enterprise data center in Moring, Michigan. With it, they are going from 23 outsourced data centers around the world to 2 data centers that are, in essence, in-sourced. This move of bringing the data centers back to Michigan and back to the full control of GM is a complete reversal of where they were.

So why are they doing this? To reduce costs? Remember that they initially outsourced their data centers to reduce costs. However, with this new move, GM says they can reduce costs by an additional 40%. In other words, they initially outsourced to reduce costs, but now they're in-sourcing to reduce even more costs, and they're consolidating and getting all the data in one location. On the surface, this almost doesn't make sense.

Actually, it makes perfect sense. To better understand why this is a strategic move for GM, we have to look at our three change accelerators—processing power, storage, and bandwidth. The exponential advances that have been taking place in all three areas have reached unprecedented levels. You've likely heard the story about what happens when you double a penny every day. Tomorrow you'd have two cents; the next day, four, the next eight, and so on. By the end of the week, you would have a whopping sixty-four cents. By the end of week two, your cache of cash would have grown to \$81.92. Not too exciting. But by day twenty-eight, just two weeks later, your pile of pennies would exceed \$1 million; on day thirty it would be over \$5 million. If this happened to be a thirty-one-day month, you would end the month with more than \$10 million.

If doubling a penny and suddenly reaching \$10 million seems dramatic, imagine this: what if the next month, you started with that \$10 million and



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TECHNOLOGY NEWS HIGHLIGHTS

Ambient Light Power

The next big thing in battery-powered mobile devices may be to do away with the battery altogether - thanks to an organic thin-film panel that generates power from ambient light.



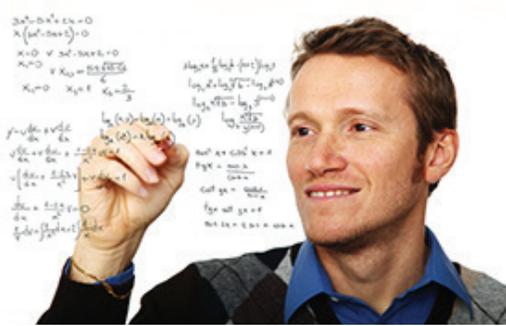
Conventional silicon solar cells capture light at wavelengths of about 1000 nanometers, and generate electricity at efficiencies of 20 to 25 percent. The new materials being considered for this application are capable of tapping into the energy present in visible light (at wavelengths of 400 to 700 nanometers) and at much lower intensities than typical sunlight. The goal is to find an organic material that could generate a minimum of 2 watts of power with a conversion efficiency of at least 10 percent to be cost-effective.

When applied around the frames of e-books, tablets or phones, the panels would be capable of powering the device using light from lamps in room. The technology could also be used to power a variety of sensors used in "smart" homes to monitor temperature, humidity and energy consumption, eliminating the need for multiple batteries, chargers and cords.

For information: Toshiba Corporation, Corporate Research and Development Center, 1, Komukai Toshiba-cho, Saiwai-ku, Kawasaki-shi, 212-8582 Japan; phone: +81-44-549-2056; Web site: www.toshiba.co.jp/rdc/index.htm

Improve Your Arithmetic

Transcranial electrical stimulation (TES) has been shown to help people with a wide range of medical conditions including depression, Parkinson's Disease, insomnia and chronic pain. Recently, U.K. researchers reported that a specific type of TES known as transcranial



random noise stimulation (TRNS) could be used to improve cognitive training in adults, particularly as it relates to math.

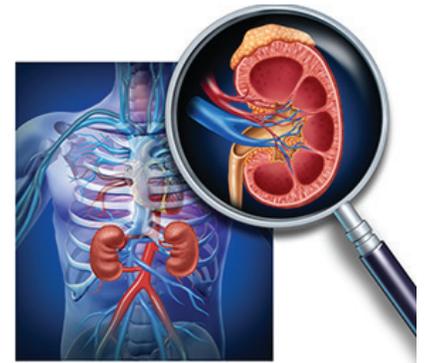
In one study, about half of the participants were given TRNS through electrodes applied over the prefrontal cortex – an area of the brain that is heavily involved in mathematical processing. The remaining participants were given a sham treatment, and both groups took part in the same five-day cognitive training. The results indicate that computation speed of the TRNS group was twice as fast as the control group, and their memory recall of arithmetic facts (such as multiplication tables) was also quicker. Furthermore, in a follow up study six months later, the computational improvements were still evident.

Although much research remains to be done, it is hoped that treatments such as this could someday help children with learning disabilities or assist stroke victims with their rehabilitation.

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Refurbished Kidney

As the number of kidney transplant recipients continues to outpace the number of donors, medical researchers are seeking



out new alternatives for patients suffering from end-stage renal failure. One option is to grow kidneys in a laboratory – and bioengineers at Harvard University have come one step closer to doing just that.

Using a kidney from a rat cadaver, they stripped the cells from the organ, leaving the extracellular protein matrix intact. This matrix contains collagen and other compounds that hold the cells together and provide the chemical cues that tell them what to do. When the kidney was seeded with healthy cells from neonatal rat kidneys and human blood vessels, the cells not only grew into a structure that resembled a kidney. They also started producing the chemical compounds needed to produce small amounts of urine. The regenerated kidney was then transplanted into a live rat where it continued to function.

According to recent estimates, there are 18,000 kidney transplants performed in the U.S. each year, while 100,000 Americans are currently waiting for a donor organ.

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Wave Energy...Revisited



Over the last decade, wave energy has had its ups and downs...technically as well as financially. Many of the problems with earlier designs were related to the fact that they focused on areas where the seas were most energetic. Enduring these extreme conditions requires bulky platforms that are expensive to build and costly to deploy and maintain.

But a new type of system (rated at 150 kilowatts) was recently installed off the coast of Italy. It promises to make harvesting energy from the ocean swells less expensive and more robust by sitting below the surface, where it's not subjected to extreme weather, but can still capture energy, albeit at lower amounts. Two buoyant sections are mounted at different depths, with one moored to the sea floor. The sections are connected by arms that move inside each other like a giant piston to generate power. The entire module can also adjust vertically to get out of the way of severe storms.

Another advantage of this design is that it produces a more consistent output, which is helpful to utility operators looking to integrate renewables into the power grid.

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Searching for Profits



A new study indicates that Google searches may be a predictor of stock market performance. Analyzing seven years of data from Google Trends, researchers looked at 98 search terms, recording how often they were used in comparison to the total number of searches. Finance-related terms such as “gold” and “unemployment” were included as well as more ambiguous words like “kitchen” and “garden.” This information was then compared to the Dow Jones Industrial Average (DJIA) closing price on the first trading day of each week for the period from January 2004 to February 2011.

The results showed that the frequency with which certain finance terms appeared foreshadowed a positive or negative change in market performance.

When another group of researchers ran a buying and selling simulation using this information, they found that an investment strategy based on the search terms yielded a much greater return than a “buy and hold” or other random strategy.

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Glasses-Free 3D Tablet



The world's first glasses-free 3D tablet was showcased at a recent expo in Taipei. The new device incorporates TriDef 3D Mobile, a content solution that automatically converts 2D photos, video and games into 3D and provides high definition 3D viewing without requiring special glasses.

The TriDef 3D Mobile platform allows games that were not specifically developed for 3D to be played in stereoscopic 3D "off the shelf." This includes some of the most popular Android mobile games including "Angry Birds" and "Blood and Glory." The 10.1-inch tablets are expected to become commercially available this fall.

For information: Dynamic Digital Depth USA Inc., 6100 Center Drive West, Suite 1100, Los Angeles, CA 90045; phone: 310-566-3340; fax: 310-566-3380; email: info@ddd.com; Web site: www.ddd.com

Synthetic Spider Silk

Spider silk has long been prized for its superior strength and elasticity, and the fibers have been used in a broad range of applications, from fishing line to artificial blood vessels. Harvesting it naturally, however, has proven to be problematic since spiders only produce the small amounts needed to construct their web, and generally consume what they've spun to reuse the protein. (Nature knows



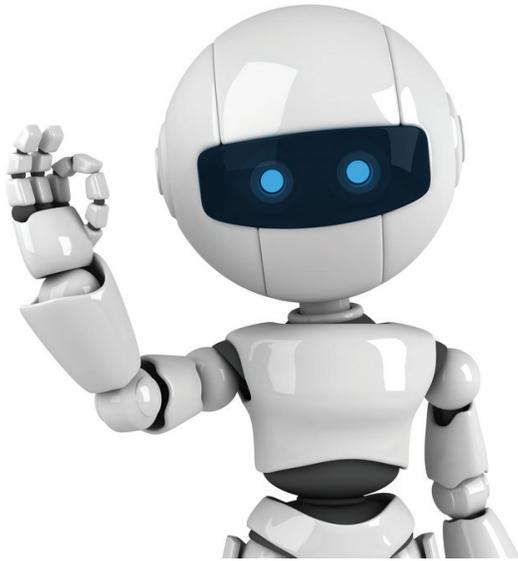
how to conserve and recycle!)

Now the goal of finding a method to manufacture this wonder material has apparently been achieved, and the first factory to mass-produce the fibers is set to begin operations later this year. The process, which is covered by 16 patents, uses bacteria that produce proteins with the same composition and characteristics as natural spider silk. Known as Recombinant Spiber™ silk, the new material has been shown to be stable at very high temperatures and in many buffers and solutions that would break down other biomaterials, and can be produced as a fiber, film, foam or mesh. It's estimated that the plant will initially be able to supply up to 100kg per month.

For information: Spiber Technologies, Biomedical Center, Uppsala University, Husargatan 3, Box 575, 751 23 Uppsala, Sweden; email: info@spiber.se; Web site: www.spiber.se/

Thoughtful Robots

Thanks to "big data" and the ever-increasing speed at which computers are able to process information, machine learning has expanded to the point where robots can interact with humans in ways that were never before possible. Instead of needing to be programmed for specific tasks, machine learning allows them to



“think” on their own by identifying patterns based on vast amounts of information.

For example, the recently-developed humanoid service robot EMIEW2 from Hitachi can identify a word – such as “camera” – using speech recognition, compare it to a database of 100 million images, and then locate the object with its built-in imaging sensors. Facial recognition technology also allows it to distinguish between the various people with whom it interacts.

The data that EMIEW2 uses for learning are stored on remote servers and accessed through a wireless network, which allows individual robots to remain compact (80 cm tall) and portable (14 kg). To make it even more user-friendly, EMIEW2 is also designed to travel at the same speed as humans and maneuver on even surfaces (like elevator thresholds) with ease.

For information: Hitachi, Ltd., Research and Development Group, Marunouchi 1-6-1, Chiyoda-ku, Tokyo 101-8220, Japan; phone: +81-3-3258-1111; Web site: www.hitachi.com/rd/portal/research/robotics/emiew2_01.html

What's Your Plan to Leverage High-Value Data?

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If doubling a penny and suddenly reaching \$10 million seems dramatic, imagine this: what if the next month, you started with that \$10 million and kept doubling? That's the change level we're approaching with the three accelerators. Consider this: what was considered the world's fastest super computer two years ago was recently disassembled because it was obsolete. And of course, as the power of those three change accelerators continue to increase dramatically and exponentially, their price continues to drop. So we can do much, much more with much, much less.

But that's not the only thing driving GM's decision to in-source their data. The nature of big data and high speed data analytics is changing too. Not only are companies creating more data than ever before, but the data they are creating is much more valuable. Here's an example.

The latest plug-in electric vehicles produce 25 gigabytes of data an hour. Some of that data is sent to the driver's smart phone so they know about the car's battery life, tire wear, vehicle performance, where the nearest plug-in stations are, plus many more things. Thanks to all this data, the driver as well as the service center can do predictive analysis of the car, which is basically being able to predict car troubles before they occur. Now the driver can fix the problem before it manifests, thus eliminating the car from unexpectedly breaking down.

The data the car produces also goes to the car maker so they can track customer satisfaction and vehicle performance, enabling them to make better vehicles in the future. In fact, the car maker can learn what's happening with the cars in real time, which enhances

their ability to continuously innovate. In this sense, data increasingly becomes the company jewels. Because there is an amazing amount of data being generated, and because the data is far more strategic, companies can get active intelligence from it to make better decisions in real time. No wonder GM wants all their data in-house.

Now, this doesn't mean that every company should have their own data center or copy what GM is doing. Many companies utilize software as a service (SaaS) to lower their software and hardware costs, and hardware as a service (HaaS) for the data storage. Those are valid options for many organizations. There are so many services that can be cloud-enabled and virtualized that we are now seeing everything as a service (XaaS) rapidly emerge, for example collaboration as a service (CaaS).

The key is to do what's best for your company today, based on the hard trends that are shaping the future and regardless of what may have worked in the past. Therefore, you need to ask yourself:

- What kind of business are we?
- What industries are converging to create new opportunities?
- What is the size and reach of our business?
- What are the ideal short, mid, and long range goals for our organization?
- How much agility do we need to stay ahead of the competition?
- How much data are we producing now and how much do we plan to produce in the near future?
- What is the value of the data we have and are now capable of collecting?
- What kind of competitive advantage can our data help us create?

Not every company generates as much data as GM. And not every company has to track hundreds of thousands of parts and supplies. But every company creates data and will create much more in the future, and that data is increasingly becoming the key to your organization's growth. Therefore, it's imperative that you think through your data plan so you can leverage your data to solve problems faster, make smarter decisions, and reach your goals faster.

Remember, too, that because the three change accelerators of processing power, storage, and bandwidth are still growing and will continue to do so, you need to re-evaluate where you are often. Even though GM is bringing their data centers back home, they'll have to look at their current strategy again in just a few years.

Times are changing fast, and the rate of change will only increase as times goes on. So what works today may not work two years from now. Therefore, whatever your company does or decides is best for today, re-evaluate that strategy often. Look at your data and where your competitive advantage is coming from so you can take advantage of the newest technologies and not be trapped in the past.

If you keep doing what you've always done in the midst of rapid change, you'll lose your competitive advantage. You either change with the times, or you get left behind. Which option makes the most sense for your company?

