DANIEL BURRUS'
TECHNO TRENDS
THE BIG IDEAS THAT ARE CHANGING EVERYTHING

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Improve Planning By Separating Hard Trends from Soft Trends

By Daniel Burrus, CEO of Burrus Research

The Burrus Hard Trend™ Methodology is a scientifically developed system based on thirty years of research. Many companies, including Deloitte, Lockheed Martin, and IBM to name a few, have changed how they forecast and strategize based on this methodology of separating Hard Trends from Soft Trends.

A Hard Trend is a projection based on measurable, tangible, and fully predictable facts, events, or objects. It's something that will happen: a future fact that cannot be changed. Strategy based on the certainty of Hard Trends has low risk. Hard Trend categories include Technology, Demographics, and Government Regulations.

A Soft Trend is a projection based on statistics that have the appearance of being tangible, fully predictable facts. It's something that might happen: a future maybe. Soft Trends can be changed, which means they provide a powerful vehicle to influence the future and can be capitalized on.

This distinction completely changes how individuals and organizations view and plan for the future. Understanding the difference between Hard and Soft Trends allows us to know which parts of the future we can be right about. Hard Trends give us the ability to see disruptions before they happen and the insight we need to create strategies based on a new level of certainty. Hard Trends also provide a way to accurately predict consumer behavior changes based on game-changing technology shifts. Soft Trends can be changed and therefore influenced, producing another way to influence the future.

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TECHNOLOGY NEWS HIGHLIGHTS

China Is Desalinating Sea Ice for Drinking Water

A technology transfer agreement between a university research team and corporate interests will soon enable China to begin producing fresh water from sea ice using a recently-developed desalination process. The equipment, which includes an ice-breaking platform and an ice-gathering mechanism, is designed to harvest vast amounts of ice from polar oceans and convert it into water that is suitable for drinking.

Compared to seawater that has a salinity of around 3 percent, sea ice is only about 0.5 percent salt, making it easier and less expensive to process. The national standard for water that can be used for drinking, agriculture and industry is 0.1 percent, and the cost of desalination using the new process is expected to be about 4 yuan (less than $1) per ton.

By 2023, the company hopes to be producing a minimum of 1 billion cubic meters of fresh water per year.

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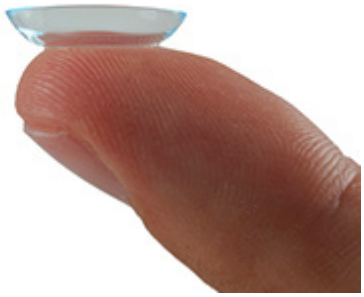
Contacts to Monitor Blood Sugar

Google has developed a new tool for managing diabetes: contact lenses that analyze the blood sugar levels in tears. The project, which is part of the Google[x] research branch, would enable people who suffer from diabetes to more effectively monitor their condition by replacing periodic skin pricks with a



discreet device that is capable of generating a reading every second.

The experimental lenses consist of a wireless sensor grid and a tiny antenna (thinner than a human hair) embedded between two layers of flexible contact lens material. While the current design allows users to check their levels on demand, the developers are also looking at incorporating tiny LEDs to provide an early warning indicator whenever levels fall outside preset limits.

Unlike today's most advanced systems that use a small amount of blood, this system uses tears. The researchers are optimistic, but time will tell if this will be accurate enough.

Diabetes currently affects one in every 19 people in the U.S. Since glucose levels can change quickly (with eating or exercise for example) frequent checks are essential to prevent the devastating effects that uncontrolled blood sugar can have on the body, including damage to the eyes, kidneys and heart.

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"Window" Displays

Engineers have come up with a means of turning ordinary sheets of glass into computer screens, a technology that could have applications from window advertising to windshields that display dashboard controls and navigation.

Using a technique known as resonant scattering, nanoparticles embedded in a transparent polymer sheet selectively scatter only specific wavelengths of light while letting other wavelengths pass through. Although initial models used silver nanoparticles, other materials could also be used in combination to display a broad range of colors.

When compared with organic light-emitting diode screens which are integrated directly into the glass, this approach is lower cost, easier to manufacture, scalable to large sizes and more transparent. Unlike other "heads up" displays that use beam splitters to project an image into the viewer's eyes, and require them to be in exactly the correct position, it also offers a wide viewing angle for far greater visibility.

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Soil Sensors

The beginning of this farming season will mark the initial tests of a new type of sensor designed to be plowed directly into the ground and wirelessly transmit information regarding soil temperature and moisture content to the surface. The driving force behind the project is the need to conserve water while still meeting the world's growing food demands.

The low-cost, low-power sensors that collect and store the information can be left in place for years without maintenance. They communicate via radio-frequency identification (RFID) chips that receive power from an RFID reader mounted on a tractor as it passes over the node.

Over the past several years, I have shared that the sensors in the soil could also send their readings to an intelligent irrigation system so that only the plants that need water will get sprayed. This could save large amounts of water.

It is currently estimated that up to 70 percent of our fresh water resources are used for agriculture, but that consumption could be reduced by 30 or 40 percent without reducing yields. In fact, optimizing water availability (not too much and not too little) could actually improve yields, which is essential if production is to keep up with rising population projections.

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Long Term Memory

A new advancement in Magnetoresistive Random Access Memory (MRAM) could revolutionize computers and other electronic systems by retaining information and data in memory for 20 years or more in comparison to about one year for current devices.

MRAM is a type of non-volatile memory that is capable of high density, low power performance. While today's MRAM chips use an "in plane" current-induced magnetization process and ultra-thin (1 nanometer) ferromagnetic structures, the new technology incorporates multi-layer structures up to 20 times thicker.

The net result is increased storage space, faster memory that remains intact even in the event of a power failure, and shorter boot-up cycles for computers, laptops and mobile devices. Other applications that will be enhanced by the new technology include transportation systems, industrial control systems, power management and health care electronics.

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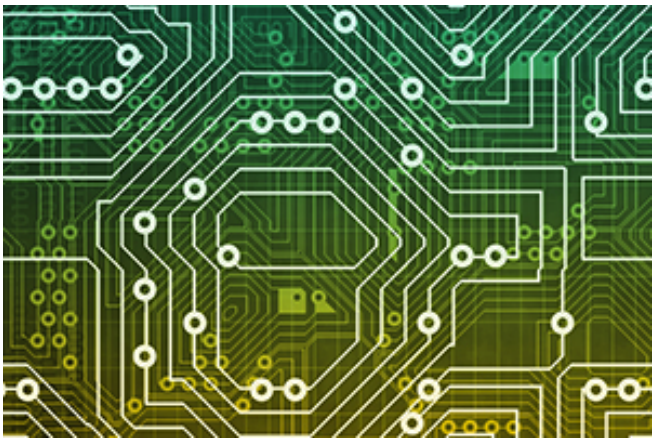
Ultra Thin Coatings



Atomic layer deposition is a technique used to deposit chemicals in layers that are only one nanometer thick. It's widely used in the manufacturing of computer chips, displays and other electronics, but requires the application of heat in order to catalyze the required reactions. Now researchers have found a way to use light instead of heat, a breakthrough that will expand the applications for these ultra-thin films.

One potential benefit of using ultra-violet light is the ability to cover larger surfaces, such as solar panels. Since the process is also more energy efficient, processes can employ higher performing materials without increasing cost. And the ability to apply the technique at lower temperatures opens up other new possibilities, including the use of atomic layer deposition in food packaging.

The researchers are beginning an 18-month feasibility study to further develop the concept for these and other high-tech manufacturing applications.

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Pollen Vaccine

Hay fever sufferers rejoice! Trials are currently underway to evaluate the effectiveness of a vaccine against grass pollen. If successful, relief could be available in as little as four years.

Hay fever symptoms are caused when antibodies known as Immunoglobulin E (IgE) over-react to pollen. In the past, this oversensitivity has been treated by injecting small doses of the allergen over a period of several years, allowing the body to build up a natural immunity. The new vaccine would offer faster relief, and would likely involve a series of four injections over the course of a few months.

The shot combines portions of a pollen molecule with a protein from hepatitis B. When the IgE antibodies are activated, the protein activates additional antibodies to block them, preventing an allergic response.

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Glowing Quantum Dots

Researchers recently discovered an inexpensive way to produce fluorescent carbon nanoparticles from coal, an innovation that has tremendous potential for biomedicine, particularly in imaging applications for observing molecular structures in cells and tissues. In comparison to conventional fluorescent dyes typically used for that purpose, they tend to be brighter and glow for longer periods.

The method involves agitating coal with sound waves, treating it with acid, and then heating it for 24 hours. The resultant particles consisted of a carbon compound, one atom thick, deposited in several layers in a highly ordered structure.

Interestingly, different types of coal (bituminous, anthracite, and coke) each yielded different size particles ranging from 2 to 40 nanometers in size. They also found that each size particle emitted a distinctly different color, making it possible to image different biomolecules with multiple colors using a single light source.

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Improve Planning By Separating Trends

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A simple example of a technology Hard Trend is the increasing use of mobile apps for business areas such as purchasing, supply chain, logistics, customer service, maintenance, training, and sales support. A related Soft Trend would be which companies will develop mobile apps such as these to transform their business processes.

A simple example of a demographic Hard Trend is the retirement of Baby Boomers. A Soft Trend relating to this would be which companies will

implement a system to collect knowledge and wisdom from their Baby Boomers and implement a knowledge-sharing network before they retire.

A simple example of a regulatory Hard Trend would be a U.S. law that was passed in 2013 that allows U.S. chicken producers to ship chicken to China for processing and then back to the U.S. for retail sales with no labeling requirements. A related Soft Trend would be trying to identify how many U.S. chicken manufacturers will process chicken in China for sale in the U.S. Another related Soft Trend would be the amount of U.S. consumer backlash that might occur.

One of the ways to put accurate timeframes on Hard Trends, is to use what I call the Three Digital Accelerators: the exponential advances in processing power, bandwidth, and storage. I've been tracking the Three Digital Accelerators, as well as their exponential trajectory, for the past thirty years.

These Three Digital Accelerators have now entered a predictable new phase due to their exponential growth—a phase that will transform every business process. Think of it this way: Based on the technology-enabled Hard Trends that are already in place, over the next five short years we will transform how we sell, market, communicate, collaborate, innovate, train, and educate. And if you don't do it, someone else will.

It is possible to avoid the fate of Polaroid, Kodak, Motorola, GM, and Blockbuster, and instead create must-have products and high-demand services—as Apple, Canon, Toyota, Netflix and so many others have—by seeing what others can't: the Hard Trends that are shaping our future.

By focusing on Hard and Soft Trends and the three accelerators instead of trying to keep up with the dozens of new technologies covered by the press each month, we can get a more accurate sense of where technology-driven change is coming from and, more important, where it is likely to lead.

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